12/#1

IMPERIAL BUREAU
10 MAY 1928
OF MYCOLOGY

Digitized by the Internet Archive
in 2025

https://archive.org/details/tropical-diseases-bulletin_1925-03-30_supplement-1

TROPICAL DISEASES BUREAU.

SANITATION SUPPLEMENTS

OF THE

TROPICAL DISEASES BULLETIN.

APPLIED HYGIENE IN THE TROPICS.

By Lt.-Colonel W. Wesley Clemesha, C.I.E., I.M.S. (retd.)

Supplement No. 1.] 1925. [March 30.

DISEASE PREVENTION.

Doorenbos (W. B.). **The Sumatra System of Sanitation and Health Control on the Holland-American Plantations Company. (Kisaran, Asahan, Sumatra.)**—*Far Eastern Assoc. Trop. Med. Trans. Fifth Biennial Congress, Singapore, 1923.* pp. 74–93. With 16 figs.

From the point of view of the Medical Officer in charge of labour in the East this is one of the most important articles that have appeared.

It deals with the administration of medical relief on what is known as the Sumatra system of central hospitals on a group of estates. The total labour force is in the neighbourhood of 10,000, nearly 9,000 males and 1,000 women, with about 600 free labourers. We gather that most of the labour is indentured, and this renders the system easy of application. In places such as the Federated Malay States, where labour moves from place to place, the difficulties are naturally increased greatly. The estates have a manager for every 1,000 to 1,800 natives.

A diagram shows the general lay out of the lines. (Fig. 1.) Rubbish is incinerated. (Figs. 2 and 3.) Latrines of various kinds have been constructed, but it would appear that the trench latrine, 1 ft. broad, 3 ft. deep and 3 ft. long, covered with a small wooden house, has not been altogether a success. (Fig. 4.) The hand removal and bucket system combined with incineration have given better results. The ration is as follows :—

0·600 kg.	...	Rice.	0·040 kg.	...	Coconut oil.
0·015 kg.	...	Salt.	0·100 kg.	...	Dried fish.
0·150 kg.	...	Fresh vegetables.	one	...	Onion.
0·060 kg.	...	Green Peas.	two	...	Pepper pods.

Inspection of all the labour takes place twice in the year.

" The assistant manager calls the labourers one by one, who enter the tent and open their clothes, lying naked on the bench. The doctor

examines spleen, liver and eyes (for trachoma) and at the same time a head dresser opposite him controls venereal diseases, scabies and leg wounds. The labourer then leaves the tent and comes before two laboratory assistants, one of whom examines the haemoglobin with Tallquist and the other makes a thick blood smear for malaria examination. He then passes two men who administer hookworm medicine. (Fig. 5.) Formerly they received oil of chenopodium, 1·2 grm. (two capsules), and at the same time castor oil or salts. At present, however, one of the dressers puts some tea in a medicine glass and adds 3 cc. of carbon-tetrachloride, while the other dresser administers the dose to the man as he passes. Plenty of cold tea is available for the labourers to drink afterwards. Although thousands of doses have been given we have never had any trouble.

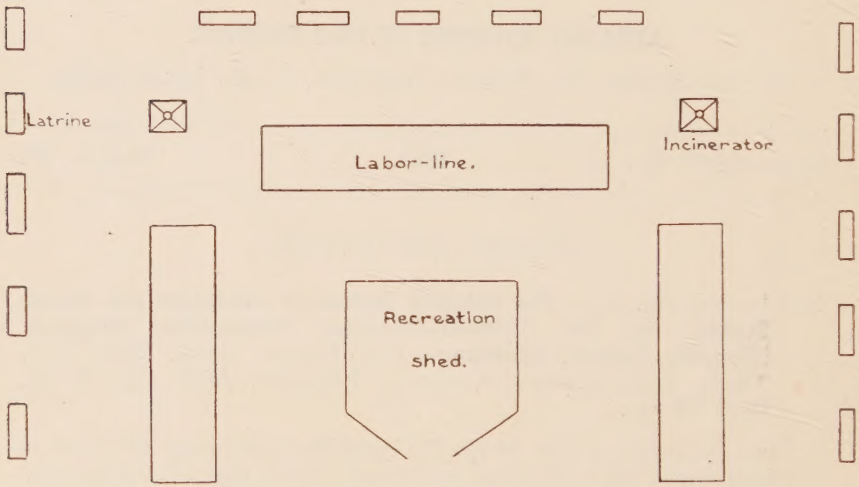


Fig. 1.—General lay-out of coolie lines on the Hollandsch-Amerikaansche Plantage Maatschappij. The lines are of wood with high roofs of atap or galvanized iron. The rooms are 9 ft. by 12 ft. in size, with cement floors, and a 5 ft. cement way with open cement drain running outside. Each room has a door and a wire-screened window (3 ft. by 3 ft.) with wooden shutter.

"After receiving the hookworm medicine the man passes behind the rows of waiting labourers and sits down in his former place. In this manner, one row after another passes and those not yet examined do not cross through those already examined.

"At a table near the tent a clerk records on the list received from the manager, after the name of the labourer, the size of the spleen, the haemoglobin content, the number of the slide, and everything found, such as leg wounds, eye diseases, scabies, venereal diseases, and if the man must be sent to the hospital. The assistant manager notes the treatments to be given on the estate, such as bandages for leg-wounds, anti-scabies medicine, medicine against trichophytia, and so on. When all have passed, the list thus made is checked to ensure that everyone has been examined."

Inspection of children is carried out by a lady, the wife of one of the assistant managers. Each child has his own index card. Much welfare work has been done amongst the women and young children.

"In the beginning there was some fear of these inspections, but

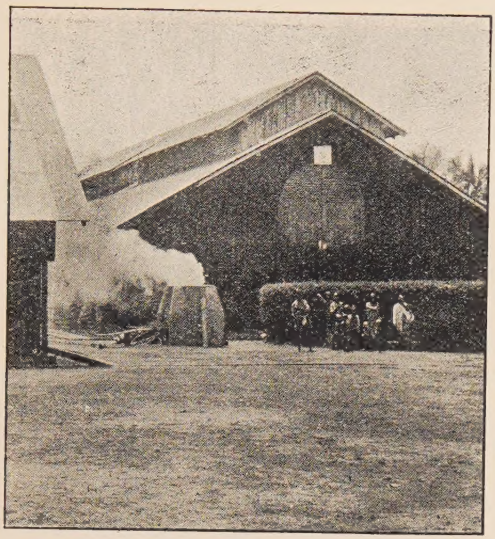


Fig. 2.—Incinerator in coolie lines, in charge of line-sweeper.

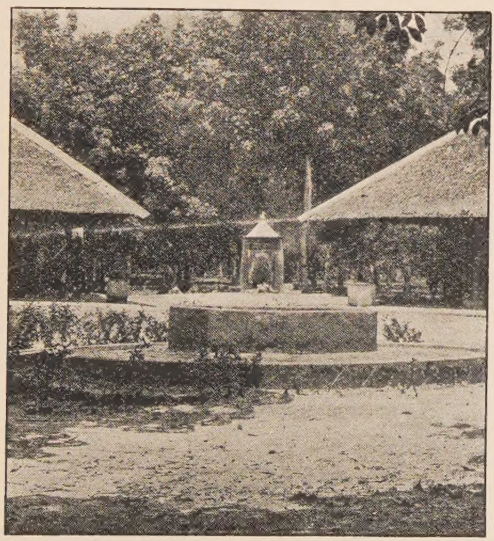


Fig. 3.—Incinerator and receptacles for refuse. The refuse is collected in covered barrels along the 5-ft. ways, and transferred to the incinerator each morning by the line-sweeper.

now the mothers appreciate more and more the value of this work. From August 1, 1922, to July 1, 1923, the average number of children was 2,156. During this period there died 221, or 10·2 per cent.; 14 children were stillborn; 328 were sent to the hospital for treatment; 3,815 treatments were given on the estate, and milk was prescribed 236 times."

Throughout Sumatra there are now 35 Central hospitals. Each institution comprises the hospital proper, a laboratory, and a

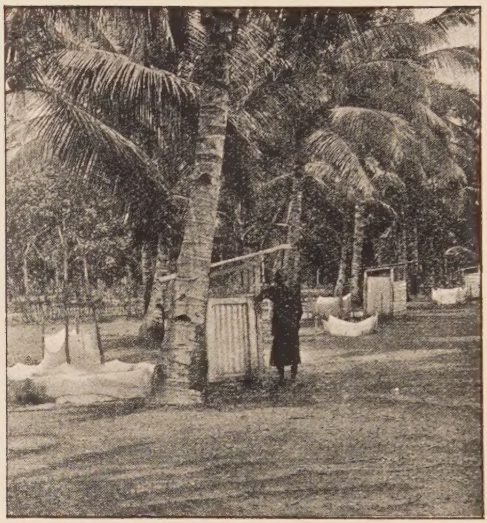


Fig. 4.—View of latrines consisting of small wooden houses with galvanized iron roofs over pits 1 ft. broad by 3 ft. long by 3 ft. deep. Though the pits had wooden covers, and the faeces were covered daily with hot ashes from the incinerator and disisfected with izal, each pit being burned out and closed after five days' use, large numbers of flies were found to breed out. Oil-tins, kept well cleaned and with 1 inch of dilute izal at the bottom, were therefore substituted for the pit latrines with good results.

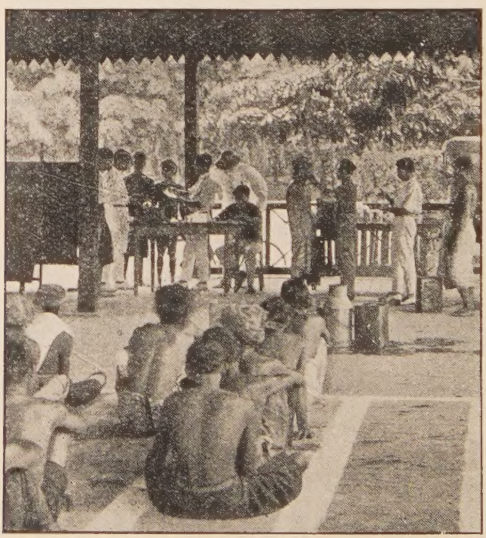


Fig. 5.—Taking blood smears, haemoglobin examination, and hookworm treatment at the six-monthly routine inspection.

[Figures 1 to 5 are reproduced by permission from the *Transactions of the Fifth Biennial Congress of the Far Eastern Association of Tropical Medicine.*]

statistical bureau. "The native staff [of one of these hospitals] includes five clerks, three laboratory assistants, two pharmacy assistants, one head dresser, two other dressers and six ward attendants. There is also the kitchen personnel and a laundryman. Two of the first-class dressers take turns as night attendants. At the present time we have only 1 per cent. of sickness, including leg wounds, venereal diseases, anaemias, etc.; the number of severely sick people is very small and one man can easily care for them. He is at the same time able to administer prescribed injections."

Maternity wards are provided and are gradually becoming very popular. The difficulty of transporting the patients to hospital is overcome partly by motor ambulances and partly by narrow gauge railways which exist throughout the estates. This gets over one of the great difficulties of this treatment, namely, that of sending the really sick person from the lines to the central hospital. Every manager's estate is linked up by telephone, which greatly facilitates the work of collecting the sick. Patients near the hospital are brought in on stretchers.

The hospital is well designed and equipped; water is laid on; latrines making use of izal are in use. First aid centres are provided on each estate.

The writer goes on to give some interesting details concerning the various diseases. Malaria is not common and hookworm is practically eradicated, great care being taken with all new arrivals.

SPENCE (B. H. H.). **The Wadi Halfa Quarantine.**— *Jl. Roy. Army Med. Corps.* 1924. Nov. Vol. 43. No. 5. pp. 321–340. With 11 figs. [2 refs.]

For the purpose of irrigation works between the Blue and White Niles it became necessary to introduce yearly 15,000 labourers from Egypt, a country where typhus and relapsing fever, other general infections and parasitic worm diseases, such as ascariasis, ankylostomiasis and schistosomiasis, are found; the last two infestations are already prevalent in the A.E. Sudan. The necessary measures were carried out at Wadi Halfa, and this interesting and instructive paper gives the details, which should be consulted by all who have a similar problem to solve, for the arrangements were ingenious as well as effective. It must suffice to print the conclusions :—

"(1). The Government of the Anglo-Egyptian Sudan, faced with the necessity of importing 15,000 labourers from Southern Egypt in the winter of 1920–21, decided to have them all inspected, loused, vaccinated and examined and treated for parasitic worm infestation, with a view both to improving their value as labourers, and to protecting the country against the introduction of bacterial, protozoal, and metazoal diseases.

"(2). The existing quarantine at Wadi Halfa was adapted for the ends in view.

"(3). With a staff consisting of one medical officer, one laboratory assistant, and thirty locally enlisted Berberines, the labourers were inspected, loused, vaccinated, and examined and treated for parasitic worm infestation at the rate of 250 a day.

"(4). 100 per cent. of 14,077 labourers from Southern Egypt were found to be lousy. All men had their heads cropped and their bodies shaved. No cases of louse-borne disease occurred amongst these men

throughout the season, whereas 2,000 Yemenis admitted at Port Sudan without proper precautions suffered severely from an outbreak of relapsing fever.

"(5). Five per cent. of 14,077 picked labourers from Southern Egypt were found to be anaemic. 0·5 per cent. were so anaemic that it was considered advisable to send them back to Egypt. In the absence of parasitic worm infestation, heavy infestation with lice was the only obvious cause of anaemia in certain cases.

"(6). Forty per cent. of 14,077 picked labourers from Southern Egypt were found to harbour from one to four kinds of parasitic worms, twenty per cent. having ankylostomiasis. Four grammes of thymol appeared to be more efficacious than three cubic centimetres of chenopodium oil in the treatment of parasitic worm infestations amongst Egyptians. In no case were more than 200 ankylostomes

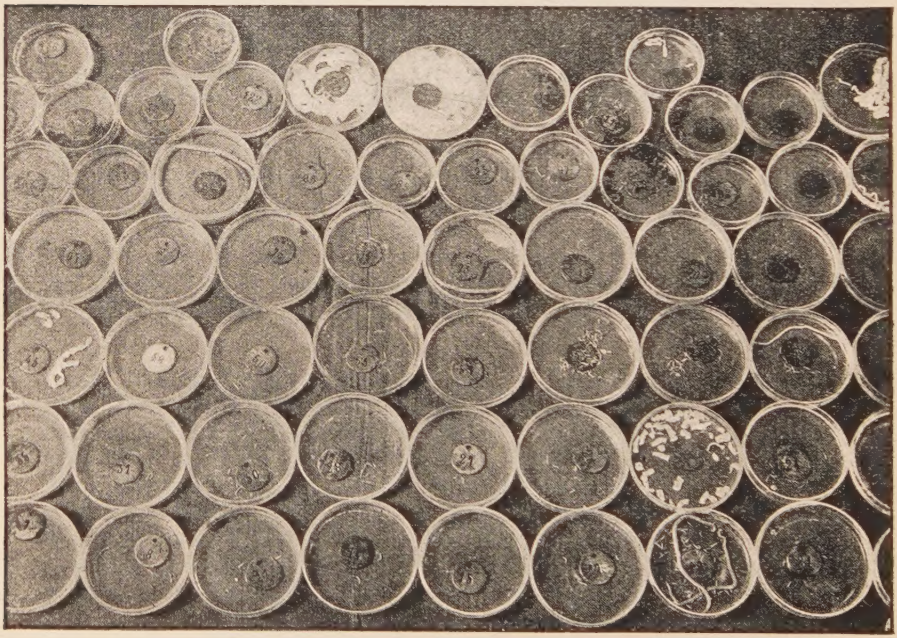


Fig. 6.—Part of a collection of worms from 150 men.

recovered from a man, a result in keeping with the general appearance of the infested men. Many thousands of male and female ankylostomes were examined. All proved to be *Ankylostoma duodenale.*

"(7). 18·5 per cent. of 14,077 picked labourers from Southern Egypt were found to be suffering from urinary schistosomiasis. 0·7 per cent. had to be sent back to Egypt on account of the severity of their disease. Twenty per cent. of these labourers suffered from nervous retention of urine when called upon to micturate during medical inspection. These men were catheterized, and in 3,000 so dealt with only one stricture was encountered.

"(8). The Government of the Anglo-Egyptian Sudan, convinced of the value of the results achieved in the first year, spent £7,000 on the

erection of permanent buildings, which were completed in 1921 and have proved extremely useful ever since."

The illustrations show the results of treatment for ankylostomiasis; the men were treated with thymol and chenopodium oil, and were purged with magnesium sulphate.

"As they emerged from the lousing building, between 11.30 a.m. and 1 p.m., they received a second purge similar to the first, and

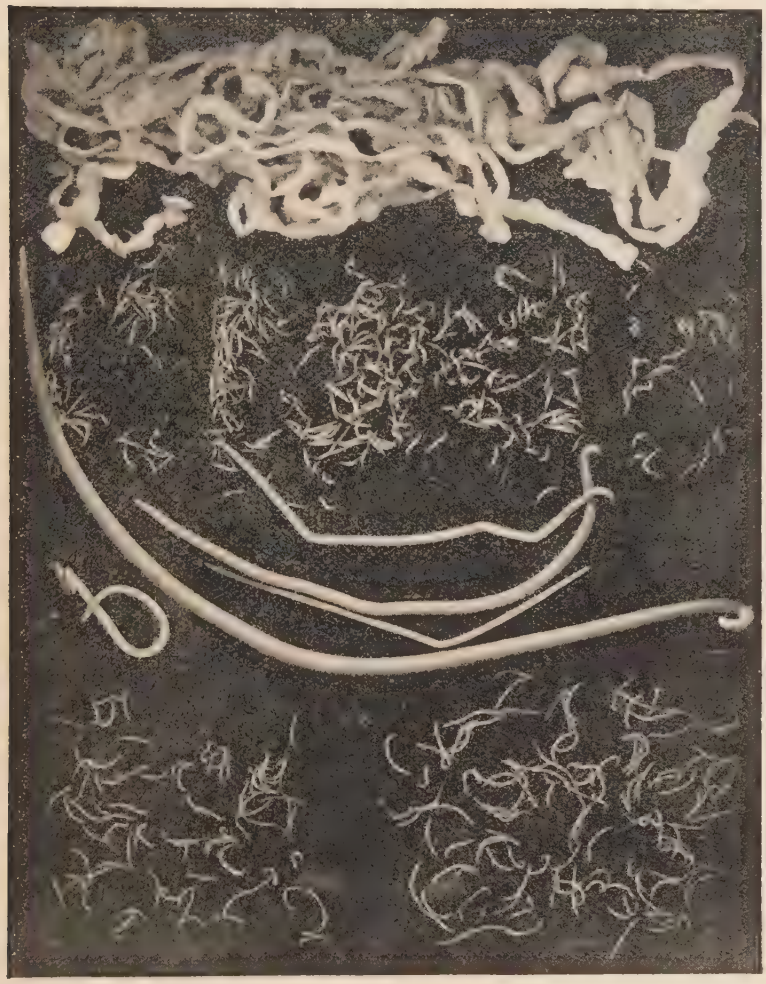


Fig. 7.—The day's haul sorted out.

[Figures 6 and 7 are reproduced by permission from the *Journal of the Royal Army Medical Corps.*]

were then shut up till 6 p.m. in a compound specially set aside for the collection and examination of faeces.

"In a room in this compound shelves were put up for the accommodation of 250 enamelled iron basins, 10 inches in diameter, with tin lids, and numbered from 1 to 250. The places for the basins

were also numbered, and in each basin was placed a metal disc bearing the corresponding number. It will be recollected that the men themselves were marked [with Ag No_3 10%] with indelible numbers. When a man desired to defaecate he entered the room and exhibited the number on his forearm to the attendant, who gave him the basin bearing his duplicate number. He defaecated into this, urinating into a separate receptacle, and then returned the basin to the attendant, who replaced it on the shelf till it was required again. In this manner all faeces passed by the men were collected between 6 a.m. and 6 p.m. on the day of treatment.

"Next morning two locally-trained laboratory attendants sifted each collection of faeces and recovered the worms for subsequent counting and classification. A basin containing faeces and identity disc was inverted over a fine wire sieve containing fifty meshes to the linear inch. A gentle stream from the tap was allowed to play on the sieve till all the soluble and finely divided material had been washed through. The sieve was then inverted over a black papier mâché tray into which the identity disc fell, followed by the worms, aided by a gentle stream from the tap. The worms, rendered visible by the black background, were easily picked up with a toothpick and placed in a Petri dish containing normal salt solution, to which the identity disc was also transferred." (Figs. 6 and 7.)

GUNASEKARA (S. T.). **Public Health in Ceylon.** - *Jl. Ceylon Branch of the Brit. Med. Assoc.* 1924. Sept. Vol. 21. No. 2. pp. 64–71. [4 refs.]

Sanitation in Ceylon is "administered" (if the term here have any real significance) at present in Colombo, Galle and Kandy by the Municipalities; in the town of Nuwara Eliya by the Board of Improvement; and in rural parts by Local Boards of Health, District Sanitary Boards, and Village Committees—but in some rural parts apparently not at all. Presumably the four large towns named have a sanitary policy; but the various local boards and committees have not, and are awakened to a sense of their responsibility only by a serious outbreak of infectious disease or by a vigorous Chairman.

The Government appears to have been not quite satisfied with this state of affairs. In 1912 the inevitable Advisory Committee was appointed to consider the institution of a properly equipped Public Health Department, having statutory powers; and in 1914 a Sanitary Branch of the Civil Medical Department was duly constituted, the efficacy of which may be estimated by a description given of it five years afterwards as a body whose officers "have no status under any law, no representation on any Board dealing with sanitary matters, and no means of securing that their advice in important matters is followed." In 1923, however, the M.O.H. of the Central Province was appointed *ex officio* member of the various Local Boards and of the single Urban District Council of that province, and one M.O.H. of the Western Province received a similar but less extensive honour; and more recently the Assistant Sanitary Commissioner of the Island has been appointed a member of the Local Board of a district having the suggestive name Moratuwa.

The author does not tell us anything of the composition of the local boards that have been thus reinforced; but as he states candidly of Ceylon that "there is very little public spirit in regard to sanitary

matters and no ' sanitary conscience ' at all among the people," and that among the lower classes " the ignorance of sanitation is appalling," one is justified—on the principle that the standards of a people are embodied and reflected in its indigenous local rulers—in doubting whether the Local Boards and Village Committees of Ceylon are capable of much discrimination, or of any constructive attainment, in matters of Public Health.

The author seems to be very sensible of the significance of the deficiencies to which he has attracted attention, and he concludes with some reasonable recommendations for their rectification.*

I. W. D. M. **Some Experiments for the Solution of the Rural Health Problem of India.**—*Indian Med. Gaz.* 1924. Dec. Vol. 59. No. 12. pp. 619–621.

The author tells us, what everyone knows only too well, that rural sanitation in India has been perfunctory. Recently sporadic attempts at improvement have occurred, at any rate, in the United Provinces, in Bihar and Orissa, and in Bengal. In Bihar the Gaya District has lately been divided into 44 sanitary circles, each having an area of about 100 miles and a central dispensary with a small staff under a doctor who receives Rs. 100 per month. The doctor not only inspects water supplies, corrects nuisances, and instructs the people in the laws of health, but also treats the sick and officially reports epidemics. A doctor like Chaucer's parish priest, " benigne, and wonder diligent," might do the job. The scheme has been going since June, 1923, and already 270,000 patients have been treated (10,000 in their own homes), 982 villages cleaned by the sanitary coolies, 12,389 wells cleansed, and many leaflets distributed and lectures and lantern shows conducted. In Bengal a " Central Co-operative Anti-malaria Society " has been formed with the object of creating local centres of public health activity throughout the village-communities of Bengal. Thirty-three centres are now in existence. The author says little of what they are doing, more than giving somewhat dubious antimony injections to kala azar patients ; and little of their financial basis, beyond that they have been backed by philanthropists and helped by two government-grants of Rs.10,000 each.

All this accomplishment does not amount to much, after all. But, as the author says, with a detached candour permissible only in a philosopher, sanitary reform must proceed with circumspection, lest the increasing multitudes too soon saved by the sanitarians from destruction by disease perish of hunger. The author faces this paradox with a surer faith in the entirely orderly progress of humanity and the steady invincibility of human foresight than the reviewer, at the present moment, can share with him.*

Massey (Arthur). **Travel and the Spread of Disease.**—*Public Health.* 1924. Dec. Vol. 38. No. 3. pp. 84–88.

This author's speculations, proceeding from a historical retrospect—albeit a sketchy one—are not to be lightly regarded. However they may have originated and spread in time and circumstance, it is common knowledge that some frightful diseases, such as plague and syphilis, have been diffused all over the world by increasing and extending

* Summarized by Lt.-Col. A. Alcock.

facilities of intercourse. The author makes this a text for an admonitory discourse on the menace of air-travel when long-distance voyages and the carriage of cargo by air become things of every day. Such speed of transport would make ordinary quarantine worthless, since (even if it were not entirely evaded) an imported infection might be in an unsuspected stage of incubation; infected vermin (rats) would speed with surer maleficence; and refuse and excreta from air-ships would not always fall harmless into the open seas. As a presage, the author reminds us of the lady, who, conveniently evading all formalities of quarantine, re-introduced rabies into this country by aeroplane. He thinks that a new medical service may be required for the airports of the future, and that its duties will include, *inter alia*, medical inspection of all passengers, fumigation of aircraft, and attention to the arrangements for disposal of the excreta of the voyage. [As a pregnant illustration of his argument the author might have instanced tularaemia—that most flagrantly infectious disease of recent discovery.]*

Home (W. E.). **Diseases of Merchant Seamen.**—*Jl. Roy. San. Inst.*, 1924. Nov. Vol. 45. No. 6. pp. 265–270. [1 ref.]

Here is some deservedly trenchant criticism of the Board of Trade Return of Casualties and Deaths in the Merchant Service. Its classification is antiquated, its price is exorbitant, and although the deaths are classified according to nationality (British, Lascar, Foreign), the necessary data for calculating death-rates are not supplied. The author has taken the trouble to get these data for himself for 1921, and has now calculated the death-rates according to nationality (as above specified) and compared them with corresponding death-rates in the Navy and the Air Force for that year. In this comparison the death-rates for the Merchant Service are excessive in respect of typhoid fever, malaria, and drink, and very high (nearly as high as the Navy) for pneumonia. As regards the components of the Merchant Service, Lascars have a mortality from pneumonia five times, from tuberculosis 4½ times, and from "all diseases" 2½ times as high as British seamen.

The author appeals to the Sanitary Institute to make petition for the seamen's health to be under the care of the Ministry of Health, and in other ways he speaks up sensibly and forcibly for poor Jack.*

i. Dinguizli. **Les sources de propagation des maladies contagieuses chez les musulmans de l'Afrique du Nord.**—*Bull. Acad. Méd.* 1924. Oct. 28. Year 88. 3rd Ser. Vol. 92. No. 35. pp. 1049–1053.

ii. ——. **Améliorations hygiéniques à introduire dans les lieux de réunion en commun des musulmans de l'Afrique du Nord. Utilité de créer en Tunisie une police sanitaire spéciale pour les indigènes musulmans.**—*Ibid.* Nov. 4. No. 36. pp. 1086–1092.

i. This is a racy paper, with some eloquent brief descriptions of the baths, barbers' establishments, cafés, etc., where the natives of North Africa congregate and spread their infections. In the baths, which are numerous and where a lot of people have to use the same water and perhaps the same towels, the author has often seen syphilitics

* Summarized by Lt.-Col. A. Alcock.

and sufferers from tuberculosis with open sores bathing among their brethren. In the equally numerous barbers' shops, where a variety of minor surgery and dentistry still dignifies the barber's profession, the cleansing of the various instruments in common use is not thought of, and the author has no doubt of their being foci for the spread of syphilis and tubercle. In the cafés the cups are very dubious, and even more so the tobacco-pipes for common use. Perhaps worse than all these are the *zaouias*, which appear to be a sort of common pot-house by day and a free lodging-house by night. The author gives a very unflattering description of the personal appearance and sanitary state of their unceasing streams of frequenters. Finally he speaks of the itinerant sellers of pastry-stuff, with their wares freely exposed to dust and flies, as a perpetual source of the bowel-complaints that "decimate the little Arab children."

ii. The author, who here professes his faith as a Mussulman and must therefore be presumed to speak with some knowledge of what his compatriots will put up with, and with some appreciation of their tastes, here proposes methods of ameliorating the insanitary disorder and confusion described in the foregoing paper. He advocates the enlisting of a native sanitary police of some sort to exercise a strict and scrutinous, but genial, supervision over baths, barbers' establishments, cafés, and *zaouias*. The present baths should be suppressed altogether, and baths capable of being cleansed, and adequately provided with sanitary annexes, substituted. The tribe of Lazarus should be driven from the *zaouias*, which should be kept closed at night; and if necessary night caravanserais could be established without the city, where the indigent unclean hordes could be disinfected. The range and nature of the duties of sanitary surveillance of baths, barbers, and cafés are described in great detail. The author believes devoutly in elementary education in personal hygiene; not only would he employ popular placards, tracts, and mass meetings in the vicinity of the mosques for educational purposes, but he would also invoke the aid of the Muses, audibly rendered through the gramophone, in all places of popular resort, so that the populace might continually hear of the blessings of a sanitary life and at last come to believe in them. He gives some samples of his own spirited Tyrtaean compositions for that instrument, some of a declamatory kind against flies and other infective vermin, promiscuous expectoration, dirty cups, and foul linen; others of a hortatory kind inculcating disinfection of implements in common use and avoidance of intercourse with obviously infectious persons.*

GORDON (Jehoasch). **Ueber den jetzigen Stand der Epidemiologie und Bekämpfung der Infektionskrankheiten in Palästina.** [Infectious Diseases in Palestine, their Epidemiology and Preventive Measures.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1924. Sept. Vol. 28. No. 9. pp. 387–397. With 1 chart in text.

An account of the incidence of disease in Palestine in 1922 and of some of the preventive measures carried on by the sanitary service established under the British administration. The overpowering disease in Palestine is malaria, which, however, seems to be decreasing with the steady progress of preventive operations. Statistics are given of the mosquito breeding-haunts dealt with in towns and

* Summarized by Lt.-Col. A. ALCOCK.

villages, the consumption of petroleum, and the issue of quinine. About 30,000 blood examinations were made in the laboratories. A good deal of information is given under the heading of Entomology, but nothing more than is to be found in BUXTON's report (this *Bulletin*, Vol. 21, p. 432). Another ever-present trouble is trachoma; though not so bad in the north, in the district of Nablus 61 per cent. of the inhabitants and in southern Palestine as many as 97 per cent. are said to be infected. Plague appeared in Jaffa in July and lasted into November; there were 63 cases and 19 deaths; 2,346 rats (grey and black) were killed and 42 found infected: *X. cheopis* was the flea. The number of persons who received antirabic treatment was 555, and 8 deaths were recorded; carbolized vaccine was used; 2,166 sick or suspicious animals were destroyed. A sudden outbreak of smallpox (37 cases, 6 deaths) occurred at Hebron in Jan.-Feb. Measles (117 cases) existed in the districts of Gaza and Ramallah, mostly in Nov.–Dec. Of scarlet fever 83 cases (no deaths) were recorded; of diphtheria 83 cases (8 per cent. fatal); of whooping-cough 193 cases (6·7 per cent. fatal); of mumps 175 cases (56 in March); of cerebrospinal meningitis 23 cases (19 deaths); of typhoid fever 208 cases (32 deaths); and of paratyphoid 63 cases (5 deaths); of relapsing fever 25 cases (no death); of bacillary dysentery 129 cases (31 Shiga and 24 Flexner Y in the stools examined). In 220 cases of amoebic dysentery amoebae or cysts were found. Typhus fever occurred sporadically all over the country throughout the year. The number of lepers in the country is given as 120; 10 new cases were diagnosed during the year. Cutaneous leishmaniasis is common. Of bilharziasis 19 cases were treated with antimony tartrate. The helminth parasites detected in the laboratory were Trichocephalus 288 cases, *Ascaris lumbricoides* 185, *Taenia saginata* 23, *Hymenolepis nana* 17, *Ancylostoma duodenale* 5.

A *P.S.* contains the following addenda:—Plague 6 cases, smallpox 1, typhoid fever 19, relapsing fever 2, cerebrospinal meningitis 3.*

GARCIA (O.), VAZQUEZ-COLET (A.). & LACY (G. R.). **Bacteriological Examination of Stools of Food Handlers in Manila.**—*Philippine Jl. Sci.* 1924. June. Vol. 24. No. 6. pp. 735–741. [1 ref.]

The authors describe an investigation into the number of food handlers who may be carriers of enteric or cholera. The conclusions are given below:—

"Schule reports that in the area served by the German laboratory at Trier it was possible to determine the source of 67 per cent. of the infections occurring in that area during 1918. Sixty per cent. of the infections were due to contact with other cases, 5 per cent. to contact with carriers, and 1 per cent. each to infected milk and water."

* * * * *

" . . . . it will be seen that the total number [in Manila] of those classed as food handlers, contacts, and healthy persons is 4,525, and that all of them were negative for typhoid, paratyphoid, dysentery, cholera, and non-agglutinating vibrio. Only a small portion of the 1,017 patients and convalescents were clinically positive for typhoid or dysentery, and from these typhoid bacillus was isolated nineteen times,

* Summarized by Lt.-Col. A. ALCOCK.

paratyphoid A bacillus once, and dysentery (Shiga and Flexner) twenty-two times."

* * * * *

"Combining the results of the two groups [only one of which is included above] we have a total of 6,143 examinations of stools from apparently healthy people with only two positive for typhoid bacilli. Using the same technic for the examination of stools from patients, we obtained a reasonable number of cultures positive for typhoid and dysentery."

HUTCHINSON (F. H. G.). **Rapport sur le lazaret de Camaran.**—*Bull. Office Internat. d'Hyg. Publique.* 1924. Apr. Vol. 16. No. 4. pp. 429–445. With 2 plans. [1 ref.]

Col. Hutchinson, the Public Health Commissioner with the Government of India, visited the Island of Kamaran, which is used as a quarantine station for pilgrims to Mecca and Medina. He describes the arrangements there, which he considers to be now satisfactory in the main (whatever they were a few years ago). There are two separate camps, one for ships free from disease and another for ships that have had cases of cholera, smallpox, etc., on the voyage to the Red Sea. These camps are entirely distinct, and each is provided with a satisfactory disinfecting station. The pilgrims on arrival have facilities for bathing, their clothes being sterilized in a steam sterilizer, and proceed on their journey within about 24 hours, provided the ship is not an infected one and unless the number of pilgrims is very great.

In the infected boats greater precautions are taken. As pointed out by the author, if the pilgrims were vaccinated for smallpox before they start this disease should be non-existent ; and if they were inoculated with a mixed cholera vaccine little or no cholera should be found amongst them. Measures taken before embarkation are therefore much more important than those taken at Kamaran.

BARNES (M. E.). **Public Health Developments in Siam.**—Reprinted from *The Nation's Health.* 1923. Oct. Vol. 5. No. 10. 5 pp. With 5 figs. [2 refs.]

The writer gives a popular account of health administration and progress in Siam. We have already dealt with this subject under the head of the annual report. The following short extracts give an idea of the arrangements and improvements that are of recent date.

"(1) Central administration. Under this head is included Government Medical Depot and the administrative control of importation and distribution of all habit-forming drugs.

"(2) Health administration. This includes infant welfare work and direct and co-operative health educational work with the Health Section of the Siamese Red Cross Society.

"(3) Control of epidemic diseases.

"(4) Public Health Inspection. This includes public health laboratory service.

"(5) Inspection of medical services, including care of the insane . . . .

"The health work of the City of Bangkok is conducted under a separate budget through the office of a medical officer of health. The programme of the office includes (1) hospital administration, (2)

laboratory service, (3) maritime quarantine for the port of Bangkok, (4) infectious disease control, (5) sanitary inspection, (6) provision of public abbatoirs, (7) medical service for the Bangkok prisons."

PALESTINE. **Proceedings of the Tenth Meeting of the Antimalarial Advisory Commission, 20th November, 1924.** [HERON (G. W.), Director of Health, President.] [MS. received from the Colonial Office.]

This report reflects great activity. One of its most interesting items is the survey of the Huleh Marshes, an area of about 175 kilometres surrounding and including the "Waters of Merom"—a very fertile tract circumscribed by hills and therefore abounding in springs and very malarious, every one of the Palestine species of Anopheles having been discovered breeding there. The survey is the prelude to a scheme for reclamation of this waterlogged area for cultivation. Some interesting statistics are given of the results of recent drainage and reclamation in the neighbourhood of Beisan: in 1922, before the institution of antimalaria measures, fifty per cent. of the patients attending the Government dispensary at Beisan were malaria cases, and the spleen-rate in schools was 50, but in 1924 the percentage of malaria cases had fallen to 12 and the spleen-rate to 25. Another item of interest is the account of the measures followed for the protection from malaria of the labour force of 450 men employed on drainage and irrigation in the Kibbarah Concession area. Hours of employment were fixed from 7 a.m. to 4 p.m., when mosquitoes, usually, are not active; for the mid-day recess special shelters were provided, to obviate resort to the suspicious shade of trees; gamete-carriers were detected and either treated or removed; quinine was given in daily alternating doses of 10 gr. and 5 gr. The prophylactic virtue of this quinine was not, however, demonstrated; all men equally received it, but while the fever incidence among the men who lived near the swamp was from 6 to 12 per cent. according to race, that of the men who lived in a neighbouring town was 1·5 to 2 per cent. An instructive lesson is afforded by the account of the annual Nebi Rubin festival held in the neighbourhood of a swamp at a time of year (August and September) when malaria most prevails. Last year it was attended by 70,000 people from towns in the vicinity. Many of the visitors ultimately developed malaria. Among the visitors was the mayor of Ramleh and his retinue of 42 persons; all but the mayor contracted malaria. Nevertheless a preliminary survey of the swamp and wadi has been made and the District Governor has taken up the matter.

In his general review the President of the Commission states that "Palestine has been satisfactorily free from any serious outbreaks of malaria during the last six months," and that the incidence of malaria in towns has been "almost negligible."*

WATSON (Malcolm). **Observations on Malaria Control, with Special Reference to the Assam Tea Gardens, and some Remarks on Mian Mir, Lahore Cantonment.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1924. Oct. 23. Vol. 18. No. 4. pp. 147–153. With 15 figs.

The author begins with an instructive reminder of his experience in the coast hills of Malaya, where ravines freed from a shade-haunting

* Summarized by Lt.-Col. A. ALCOCK.

malaria-transmitting mosquito (*Anopheles umbrosus*) by clearing away jungle, were discovered to be merely prepared for the invasion of another transmitter (*A. maculatus*) that prefers open country. The trouble was rectified by subsoil drainage (and oiling) of the breeding places of the latter species.

Then he describes Upper Assam, the rich alluvial "valley-way" (as some physiographers call it) of the Brahmaputra. This valley-plain, once covered with jungle, is now under rice-cultivation. The local species of *Anopheles* are *A. fuliginosus, minimus, sinensis, maculatus, gigas, rossi* var. *indefinitus*, and *barbirostris*, of which *minimus* and *maculatus* are the dangerous ones. The estates most afflicted by malaria were among the best managed in Assam, no pains being spared to ensure the health of their coolies. In various places where *A. maculatus* and *minimus* were abundant the spleen-rate among children (altogether 9,146 were examined) was 69 per cent. "Cattle, which were in great abundance, seemed to give the coolies little protection," although *A. fuliginosus* was found far more abundantly in cow-sheds than in houses in Jan.–Feb.

"The physical features associated with malaria were: (1) River-valleys, whether large or small, but not when as large as the Brahmaputra at Dibrugarh. (2) Swamps and *bhils* in dead river-beds or in the flood-plains of living rivers. (3) Natural hollows or water channels, which may be dry in the dry season. (4) Narrow rice-fields under certain conditions, especially in land above the 400 ft. level. (5) Wet waste land, *kurkani* land, and some thatch land.

"The physical features not associated with malaria were: (1) Broad, flat rice-fields. (2) Old broad, dead river-channels, dry in the dry season. (3) Dry thatch land, if not *kurkani*. (4) Bamboo clumps. (5) Some brickfields."

As it would have been too destructive and expensive to any individual estate to remove the cooly-lines to a central spot (and to abolish all the Anopheles breeding-places within half-a-mile radius of it), the plan of malaria-prevention recommended by the author was, drainage of breeding-places (aimed particularly at *A. maculatus* and *A. minimus*), the use of oil where necessary, and administration of cinchona to children and fever cases.

As regards Mian Mir, which he visited after leaving Assam, the author considers that it is not and never has been properly drained. It has been assumed that no outlet for drainage exists, but the question of pumping does not seem to have been considered.*

LePrince (J. A.). **What the Engineer can and should do toward Prevention of Malaria and Mosquito Nuisances.**—*Amer. Jl. Public Health.* 1924. Dec. Vol. 14. No. 12. pp. 1035–1037.

Few will dissent from the opinions here expressed that in anti-malaria operations [it may be presumed that the author refers to operations on an extensive scale] there is a very considerable technical element that lies exclusively within the province of the engineer. It is true that the engineer, concerned only with certain of his own particular professional pursuits, may unconsciously have been—or still be—responsible for the creation of breeding-places for mosquitoes, and even that some of the engineers at Panama were inclined to be facetious over the anti-mosquito measures that ultimately ensured the

* Summarized by Lt.-Col. A. Alcock.

construction of the Canal. But, in the fullness of our present knowledge of malaria causation, this should teach us, not to despise the co-operation of the well-informed engineer in devising definite anti-mosquito plans, but rather to co-operate so closely with the engineering profession that all its members become sufficiently instructed to eschew "engineer-made Anopheles production" and "building malaria in" as deadly professional sins even in enterprises not directly connected with sanitary engineering. The author gives here a programme of what the engineer can do in this matter; but as it is devised to instruct and influence his own, rather than the medical profession, the plea of *ne sutor supra crepidam* may justify this brief acknowledgment of its educational purpose.*

United States. **Treasury Department. Annual Report of the Surgeon General of the Public Health Service of the United States for the Fiscal Year 1923.** [Cumming (H. S.) Surgeon General.]—pp. vi +316. With 10 figs. 1923. Washington: Govt. Printing.

"*Studies of highways in relation to malaria.*—'Man-made malaria'—that is, malaria caused by man's interference with natural drainage—has frequently followed highway construction in many parts of the United States. Because of the recent impetus given to the building of good roads, this subject has been considered of sufficient importance to warrant special study at this time. The matter was taken up with the Chief of the Bureau of Public Roads, with the district engineers of this bureau located in the South, and with the various State health officers and State highway engineers concerned. The importance of placing culverts low enough so that they will drain all possible mosquito-producing areas near by and the abolition of all roadside borrow pits was pointed out to those in charge of highway construction. It has been found that these details, so important from a health standpoint, are much better taken care of on those highways constructed under the Federal highways act than is the case with the roads which are being built by county road commissioners. Effort is being made to impress county commissioners and road supervisors with the importance of roadside drainage."

World's Health. 1924. Feb. Vol. 5. No. 2. pp. 45–47.—**Fighting Malaria. III.—In Greece.**

This article gives a popular account of anti-malarial measures in Greece, viz.: anti-larval measures, popularization of quinine, and propaganda. Throwing common chalk in a fine powder on the surface of stagnant water about once a week is used as a means of making puddles unattractive to mosquitoes. Whether this has any real effect or not the writer does not say.

Barber (M. A.) & Komp (W. H. W.). [**The Hydrogen Ion Concentration of Waters in Relation to Anopheline Production.**]—*Trans. Fourth Conference Malaria Field Workers Chattanooga, Tenn. November 14–16, 1922. Public Health Bulletin.* No. 137. pp. 11–12. [Summarized in *Public Health Engineering Abstracts* 1924. May 24. J.—712.]

"Several hundred determinations of the hydrogen-ion concentration were made by the colorimetric method in some 50 different ponds, pools,

* Summarized by Lt.-Col. A. Alcock.

ditches, springs and other varieties of water. The work was done in Escambia County, Alabama, during the period July-November, 1922, a period showing great variations in dryness and temperature. The hydrogen-ion concentration varied from a pH of 5·0 (ditch below a certain spring) to a pH of 8·0 (overflow of artesian wells). Abundant Anopheline production was found in both of these extremes and in waters of nearly every intermediate grade of pH between them. Many larvae were bred out for identification, and all three species of anopheles common in that region, *Anopheles punctipennis*, *A. quadrimaculatus* and *A. crucians*, were found in waters of greatly varying pH.

"Field observations on the growth-rate of larvae indicated that there was no measurable difference in the growth-rate of anopheline larvae in water of a pH of 6·0 and one of 7·5. The general conclusion was that over the pH range tested no measurable correlation appeared between hydrogen-ion concentration of waters and intensity of anopheles production in the case of any of the three species of anopheles common in the southern United States.

"During 1923 and 1924 anopheles breeding has been observed in southern Louisiana in waters ranging from a pH of 6·0 to one of 8·0 and above. In aquaria the growth rate of anopheles larvae has been about the same in a water of 6·2 as in one of 8·0."

KENYA MEDICAL JOURNAL. 1924. Sept. Vol. 1. No. 6. pp. 159–165.—**The Economic Aspect of Plague in Kenya.**

The following short extracts are of interest.

"The cotton ginneries and stores which have been recently constructed in Kavirondo have . . . . good cement concrete flooring . . . while the galvanised iron walls have a projecting ledge bolted on about two feet six inches above the ground level. . . . . .

"In dwelling houses and shops precautions should be taken to prevent access of rats to food. The problem is simpler than where grain stores are concerned, and merely consists in the storage of foodstuffs in rat-proof receptacles. Small collections of bagged grain should be stacked on trestles. Houses and shops should, wherever possible, be of permanent construction as already indicated. The old type of plinth, composed of stones, earth, and a thin coating of cement, on which small shops in Reserves and outlying townships were formerly erected, should disappear for ever; it is difficult to imagine a more desirable form of residence from the rat point of view than buildings of this kind. . . . .

". . . The only method of adequately dealing with rats, so far as close contact with man and his commodities are concerned, is to build them out of existence."

RAYNAUD (Lucien). **Note sur la peste en Algérie dans les vingt-cinq dernières années. Cas humains.—Espèces de rats et de puces de rats. Organisation de la lutte.**—*Bull. Acad. Méd.* 1924. Nov. 18. Year 88. 3rd ser. Vol. 92. No. 38. pp. 1188–1192. With 1 fig.

In the 25 years 1899-1924 four hundred cases of plague were reported in the various ports and inland towns of Algeria—349 bubonic, with 147 deaths; 30 pneumonic, with 28 deaths; 19 septicaemic, with 17 deaths; 2 "typhic," both fatal. In 1907 a ratticide service was established, with branches at Oran, Algiers, Bougie, Philippeville,

Bône, and La Calle, and between 1908 and 1924 near a million rats were accounted for and identified, along with their fleas. Of the rats 74 per cent. were *Mus decumanus*, 13 per cent. *M. rattus*, 4·5 per cent. *M. alexandrinus*, and 11 per cent. were merely "mice." Of the fleas *Xenopsylla cheopis* was by far the commonest; the other species were *Ceratophyllus fasciatus, Ctenopsylla musculi, Ctenocephalus "serraticeps,"* and a small percentage (0·4) of *Pulex irritans.*

The author states that plague becomes attenuated in the native rats but becomes virulent again through importation of fresh strains from abroad.*

Wu Lien-Teh. **Plague in Wild Rodents, including the Latest Investigations into the Röle played by the Tarabagan.**—*Far Eastern Assoc. Trop. Med. Trans. Fifth Biennial Congress Singapore, 1923.* pp. 305–340. With 5 figs. [102 refs.]

In this article, which contains much information on the subject of the title, there are two tables which may be usefully reproduced.

Table I.—List of Rodents known to suffer from Spontaneous Plague other than the Domestic Rat and Mouse.

Name.	Locality.	References.
(*a*) Tarabagan, *Arctomys bobac*	Transbaikalia, Mongolia, &c.	Bjeliavski & Rjeshetnikoff, "Vestnik Obstchestvennoi Guigieny," 1895.
b) Sisel (suslik), *spermophilus*	Kirghiz Steppes	Deminski, *Russki Vratch*, 1913, No. 30, p. 1069; and Berdnikow, *Zentralb. f. Bakt.*, 1913, vol. lxix, pp. 251–259.
(*c*) Jerboa (family Dipodidae, species *Dipus*)	,,	Berdnikow, *ibid.*
(*d*) Californian ground squirrel, *Citellus beechyi*, Richardson.	California ...	Wherry, *Journ. Infect. Dis.*, 1908, No. 5, pp. 485–506; and McCoy, *U.S. Public Health Report*, 1908, No. 37, pp. 1289–1923.
(*e*) Dusky-footed wood rat (brush rat), *Neotoma fuscipes*, Baird.	,,	McCoy and Smith, *Journ. Infect. Dis.*, 1910, vol. vii, pp. 368–373.
(*f*) Field rat, *Hesperomys pulustris.*	New Orleans	William, *Amer. Journ. Public Health*, November, 1920, p. 13 of Reprint (I)
(*g*) Gerbille, *Tatera lobengulae*	South Africa	Mitchell, *Journ. Hyg.*, 1922, No. 4, p. 377–382; and Haydon, *Lancet*, November 26, 1921, pp. 1103–1104 (2).
(*h*) Multimammate mouse, *Rattus coucha.*	,,	,, ,, ,,
(*i*) "Striped mouse," *Arvicanthus pumilio.*	,,	Mitchell, *Journ. Roy. Army Med. Corps*, 1906, vol. vi, p. 130.
(*j*) *Cricetomys gambianus* Waterhouse.	Gold Coast ...	Graham in Simpson, Report on Plague in the Gold Coast in 1908, pp. 21–25.
(*k*) *Pelomys fallax iridescens* Heller.	East Africa...	Lurz, *Arch. f. Schiffs- und Tropenhyg.*, 1913, No. 17, pp. 593–599.
(*l*) Tree Rat, *Mus.* (*Thamnomys*) *aff. dolichurus* Smuts.	,,	,, ,, ,,

* Summarized by Lt.-Col. A. Alcock.

TABLE I.—*continued.*

Name.	Locality.	References.
(*m*) Squirrel, *Sciurus palmarum*	India ...	Simond, *Annal. de l' Inst. Pasteur*, 1898, p. 664 (3)
	Ceylon ...	Colombo Report, 1922, p. 41.
(*n*) Bandicoot, *Bandicota indica* (*Nesokia bandicota*)	India ...	*Journ. Hyg.*, 1907, Plague No., p. 760; and 1910, Plague No., pp. 459–460.
(*o*) Small bandicoot, *Nesokia bengalensis.*	,, ...	Hossack, *Journ. and Proc. Asiat. Soc. of Bengal*, New Series, vol. v (1906).
(*p*) *Bandicota malabarica* ...	Ceylon ...	Philip and Hirst, *Journ. Hyg.* 1915.
(*q*) Porcupine *Hydrochoerus capybara.*	Mysore (India)	Bruce Low, Local Government Board Report, 1898–1901, p. 317.
(*r*) Guinea-pig, *Cavia cobaya*...	Sydney ...	Thompson, Report of the Board of Health on a Second Outbreak of Plague at Sydney, 1902.
	India ...	Liston, *Journ. Bombay Nat. Hist. Soc.*, 1905, vol. xvi, p. 253; and *Journ Hyg.*, 1908, vol. vii, p. 891.
	Manila ...	Schoebl., *Phil. Jour. Sci.*, 1913, pp. 417–421.
	Senegal ...	"Noc. Rep. sur le fonctionnement du Lab. de Bact. de L'A. O. F. en 1919," Dakar, 1920.
(*r*1) [*Cavia aperca*	Argentine ...	Uriarte & Gonzalez, *C.R.* Soc. *Biol.*, 1924, vol. 91., p. 1040.]
(*s*) Rabbit, *Lepus cuniculus*...	India [?] ...	*Journ. Hyg*, 1908, vol. vii, p. 891.
	England ...	Martin & Rowland, "Observations on Rat Plague in East Suffolk," 1910.
(*t*) Hare, *Lepus timidus* ...	England ...	Martin & Rowland, *Ibid.*, and Bulstrode, Local Govt. Board Report, 1910–11, p. 36
(*u*) "Large field-rat" ...	Senegal ...	Laveau, *Bull. Soc. Path. Exot.* 1919, pp. 482–484 (4).
(*v*) Field-rat	Tunis ...	Gobert, *Arch. Inst. Pasteur de l' Afr. du Nord*, 1912, pp. 440–446 (4).
(*w*) Field-rat	Rhodesia ...	Kinghorn, 1918, quoted *Trop. Dis. Bull.*, vol. xiii, p. 324 (4)
(*x*) Field-rat	Persia ...	Grekoff, quoted by Clemov, *Lancet*, 1913, June 14, p. 1697 (4).
(*y*) "Wild mouse"	Astrakhan ...	Zabolotny, *Arch. f. Schiffs- und Tropenhyg.*, vol. xxvi, 1922, p. 382.
(*z*) "Black marmot"... ...	Semiretchinsk	Russian Public Health Report, 1907, p. 162.

REMARKS.—(1) Most probably identical with the "field-rodent Louisiana," mentioned by McCoy loc. cit., 1921.

(2) Gerbilles were found infected in Tunis as well (see Gobert, loc. cit.), *Rattus coucha* in Uganda (see Uganda Protectorate Annual Medical and Sanitary Report for 1921, pp. 96–99).

(3) One palm-rat was found infected in Senegal (see Laveau, *Bull. Soc. Path. Exot.*, 1919, pp. 291–296).

(4) The four last-named field-rats were mentioned because it could not be determined if they, i.e., the field-rat of Java, are a variety of *Mus rattus* (see Swellengrebel, *Geneesk. T. v. Ned.-Indië*, 1913, pp. 53–154) or not.

(5) The shrews (Crocidurae), often called "musk-rats," belonging to the order of Insectivora, are not included, although they are known to suffer from plague [Senegal and French Indo-China].

TABLE IX.—FLEAS OF RODENTS SUFFERING FROM NATURAL PLAGUE.

Host.	Flea.
Tarabagan ... ... (*Arctomys bobac*)	*Ceratophyllus silantievi* Wagner, 1898
Californian ground squirrel ... (*Citellus beechyi*)	*Ceratophyllus acutus* Baker. *Hoplopsyllus anomalus* Baker.
Gerbille ... ... (*Tatera lobengulae*)	*Dinopsyllus lypusus.* *Xenopsylla eridos* *Listropsylla stygius.*
Multimammate mouse ... (*Rattus coucha*)	*Dinopsyllus lypusus.* *Echidnophaga larina.*
Striped mouse ... ... (*Arvicanthus pumilio*)	*Dinopsyllus lypusus.* *Xenopsylla eridos.* *Chiastopsylla octavii.* *Listropsylla stygius.*
Cricetomys gambianus ...	*Pulex cheopis* (R.). *Ctenophalus serraticeps.*
Indian squirrel ... ... (*Sciurus palmarum*) ...	Fleas similar to *Ceratophyllus fasciatus.* *Loemopsylla cheopis.*
Small bandicoot ... ... (*Nesokia bengalensis*)	*Pulex cheopis.*
Rabbit ... ... (*Lepus cuniculus*)	*Spilopsyllus cuniculi.* *Ceratophyllus fasciatus.*
Hare ... ... (*Lepus timidus*)	*Spilopsyllus cuniculi.*
Kilimandsharo rats ... ... (*Pelomys fallax iridescens, Mus* (*Thamnomys*), *aff. dolichurus*).	*Loemopsylla cheopis*, rarely. *Ctenopsylla musculi*, very rarely. *Ceratophyllus fasciatus.*

Table 9 may be compared with the similar table of BACOT (1919) (see this *Bulletin*, Vol. 16, p. 45).

BLACKLOCK (D. B.) & PEACOCK (W. H.). **Note on the Destruction of Rats by Exhaust Gas.**—*Lancet.* 1924. Sept 13. pp. 568–570. [1 ref.]

We have already had several articles on this subject. The writers quote a large number of experiments carried out in boxes in the holds of lighters with both grey and black rats. In every case five minutes' exposure in a confined space into which the exhaust gas of a petrol motor was discharged killed the rats. In a ship's lighter of over 2,000 c. ft. capacity 35 minutes was usually necessary. The gas has no effect whatever on such articles as lard, butter, sugar, bacon, etc. It possesses great penetrating powers and on opening up the holds very readily diffuses.

DUJARDIN-BEAUMETZ. **La dératisation, rapport sur la dératisation au nom de la Commission spéciale.**—*Ann. d'Hyg. Publique, Indust. et Sociale.* 1923. Mar. New Ser. pp. 124–144.

This paper gives an interesting description of the black and grey rat, its habits, and the best method of getting rid of it with poisons, traps, asphyxiating gas, etc. There is practically nothing in the paper which has not been described in much greater detail in other articles in these Supplements. The writer suggests for Paris that it is very necessary to have an evening service of collection of household rubbish, and not to allow it to remain all night as a source of food for the rats.

GELONESI (G.). **Derattizzazione col virus Danysz.**—*Ann. di Med. Nav. e Colon.* 1924. Year 30. Sept.–Oct. Vol. 2. No. 3–4. pp. 153–159.

The region of Southern Somalia was over-run with rats. An American preparation, Rat-Nip, containing phosphorus, was first used with good results, but the animals soon learned to avoid it, so Danysz virus was employed. The effects surpassed expectations. After 29 days the numbers were much diminished in one district, and a second distribution of the virus is said to have got rid of the pest altogether. In another district it was equally successful. Besides killing rats eating infected food, the virus acted indirectly by killing those feeding upon the dead rats, the bacillus, it is believed, gaining in virulence by passage through the animals. Nevertheless, total eradication by this means is said to be impossible because, apart from other considerations, the district is surrounded by extensive woods in which the rats can hide and breed in vast numbers.*

VERVOORT (H.). **Some Remarks on Rat-Proof Roof-Building.**—*Far Eastern Assoc. Trop. Med. Trans. Fifth Biennial Congress, Singapore,* 1923. pp. 348–351. With 23 figs.

The writer deals with the subject of rendering roofs of native houses (made of palm leaves and wood or native tiles) unattractive so that they will not harbour rats.

He considers that it is possible even with atap (the leaf of the sago palm) to make a roof which is practically rat proof. They usually select the ridge for their abodes, and if this is prevented, the method of which is shown in the photographs and drawings, rats disappear; they do not live between the layers of leaves themselves.

"When covering the roof with atap, as a rule the last strip meets the opposite one at the top, in the way as given in the accompanying diagram (Fig. 8), and the whole is covered by a metal or wooden rabong

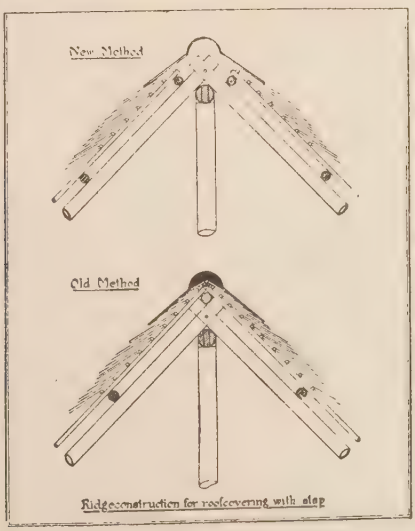


Fig. 8.—Showing proper and improper methods of ridge construction with atap.

* Summarized by Dr. H. Harold SCOTT.

(cope). Instead of meeting each other at the top and at the corners, there must remain a space between the ataps of about 4 in. between both sides. For this reason the wood construction of the roof has to be changed in so far as the ' toe-toep goeloeng ' has to be replaced by two strong girders (goeloeng) near the top. At the corners there has to be placed a strong ' kassau miring.'

" The figures (9, 10 and 11) will explain the construction of a model house.

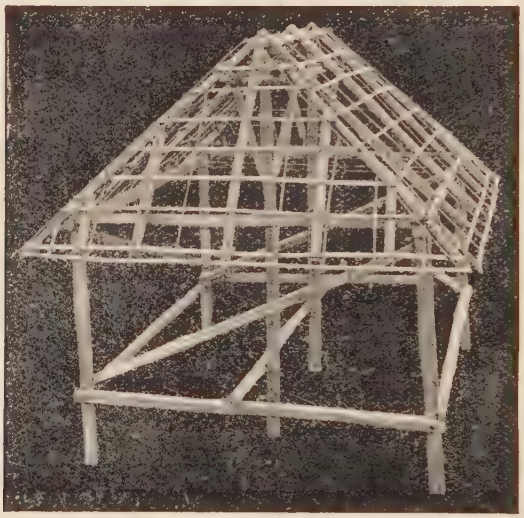


Fig. 9.—Showing wood construction of a model rat-proof atap roof.

Fig. 10.—Showing open corner-ridge of a model atap roof before covering with zinc coping.

Fig. 11.—Showing finished roof of model house with zinc covering over the open corner-ridge.

"The atap is fixed no further than those parts and the corner spaces remain open, to be covered up by a zinc cope (raboeng), which can be surveyed from the inside. In 1918 I covered a show house in this way, surrounded it by a stone wall, and placed several hundreds of rats in it, but they could find no place for nesting and became a prey to their enemies."

Malacca Tiles.—"Another way of roof covering, much employed by Chinese, is with Malacca or Chinese tiles. Seldom one sees these tiles on Java, but nearly everywhere on Sumatra and a part of the Outer Dominions, and specially in Malacca and the Straits. A roof

Fig. 12.—Showing improper and proper methods of constructing a tiled roof.

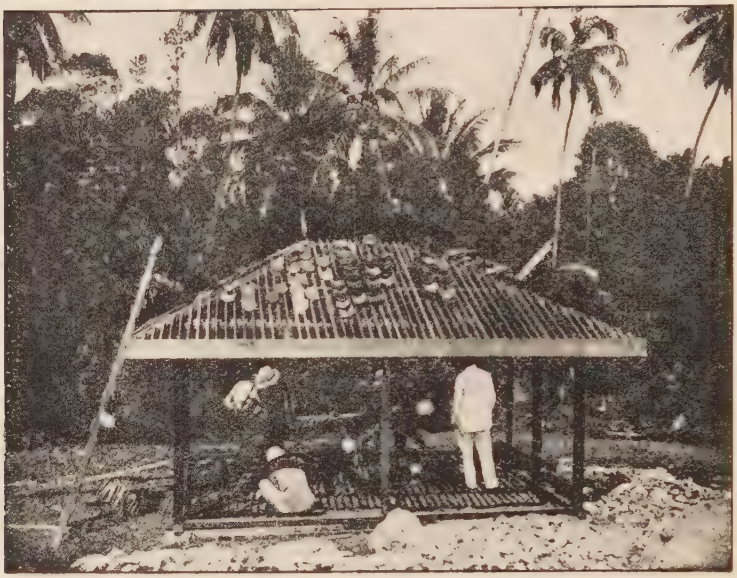


Fig. 13.—Showing wood construction for tiled roof.

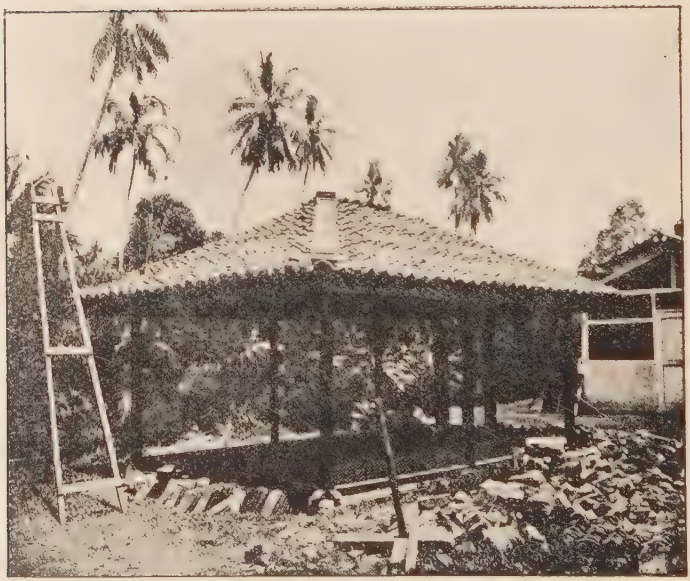


Fig. 14.—Showing a completed tiled roof.

[Figures 8 to 14 are reproduced by permission from the *Transactions of the Fifth Biennial Congress of the Far Eastern Association of Tropical Medicine.*]

covered with Malacca tiles offers splendid sheltering places for rats. The construction is such that two tiles with the hollow side up are supported by a flat lath and covered by a third tile, hollow side down, which forms, with the lath, a space that may be filled up with rat-nests without it being visible. Instead of flat laths of 3 by 1 in., I proposed to use two laths of 2 by 1 in., that are placed narrow side up. A covering in this way gives no space between wood and tile, and no room for nesting, as seen in the accompanying diagram." (Figs. 12, 13 and 14.)

FLU (P. C.). **Mesures de prophylaxie anticholérique et antipesteuse aux Indes Néerlandaises.**—*Bull. Soc. Path. Exot.* 1924. Oct. 8. Vol. 17. No. 8. pp. 703–714.

The author notes that the Dutch East Indian archipelago has a coast-line as extensive as the equator and that the number of ports is as high as 275. These are divided into four classes. Those of the first class are four, Batavia, Soerabaya, Belawan and Sabang. These have a full-time port health officer and a complete sanitary organization. so that ships can be disinfected of plague or yellow fever. Of the second class there are 26 ports, and here the port health officer has other duties; they are provided with a hospital with isolation huts and steam disinfection plant, but plague-suspected ships are not admitted unless thay have apparatus for clearing themselves of rats. Cholera-infected ships are admitted freely. The 55 ports of the third class have a European or native doctor, but no means of isolation or apparatus of disinfection; ships suspected of cholera are admitted. The ports of the fourth class, 190 in number, having no doctor, would be barred to ships flying the quarantine flag if the P.M.O. were not allowed to admit under certain conditions ships suspected of cholera. His is not an easy task; he has to give permission on insufficient data and risk infection of the port, or to refuse and disorganize the victualling of a large territory served by it. These ports, moreover, are used by a large number of small vessels from British territory which cannot be controlled.

The introduction of vaccination against cholera by NIJLAND completely changed the attitude towards that disease. The history of cholera at Batavia from 1909 is given. The disease was present every year, causing many deaths till 1913, when it disappeared. Every effort was made to prevent its re-importation, native passengers were carefully examined, stools of suspects were sent to the laboratory. On August 2 some cases were detected, on the 14th cholera broke out in Batavia, and in September there were 110 cases and in October 675. The examination of all stools was quite impracticable, partly owing to the numbers and partly to the fact that a single negative examination has been shown to be insufficient, and that passengers must be retained, and maintained, for further examination. In 1914, in the course of 14 days, 60 per cent. of the population of 350,000 were vaccinated against cholera. Cases began to diminish at once; in December there were 26 and in January 3. The population of Batavia is now vaccinated every 6 months, and the few cases that appear are among foreigners or natives from the interior. Before inoculation was practised the ports in regular communication with Batavia always became infected sooner or later; now every native

passenger leaving for one of these ports is inoculated, and since then they have remained free. The practice is also of great value for the pilgrims, 50,000 or 60,000 of whom leave the Dutch East Indies yearly for Mecca; since 1913 all have been vaccinated against cholera, smallpox and enteric, with the best of results. The first class ports are provided with drinking water of high quality, the best of all precautions against cholera.

The subject of the remainder of the paper is plague. It is abundantly proved that if we were able to prevent the transport of rats by ships there would be no overseas transport of plague. In practice the ordinary measures of deratization and other means, such as the prescription to ships to lie at a distance from the quay and to employ rat guards on the cables, fail, as the infection of ports in Europe has proved. Rat plague is very persistent; it is impossible to be sure that it has disappeared when it has once been present. When plague was introduced into Java in 1911, infected towns and villages were first evacuated, but the people soon rose against these measures. The houses were then severally enveloped in canvas impregnated with pitch and sulphur was ignited. The effect was to drive the rats to shelter, and the fleas often remained to start a fresh epidemic. In the fumigation of the holds of cargo-laden ships it was found that the fleas took shelter between the fibres of the rice or grain sacks as well as inside them, and were unharmed. Experimenting with small vessels the medical officers were always able to kill the rats, but fleas survived buried in the grain. With empty holds all the rats and most of the fleas can be destroyed.

Different measures are now undertaken. The medical service in the Dutch Indies has organized "deratization" of railway wagons and the lighters which convey the cargo from warehouse to ship. By fumigating the lighters every 3 months it is possible to keep down the rat population to one rat per ten lighters; at the outset the number of rats was enormous. Ships which put in 2 or 3 times a year are similarly treated. Fleas are the chief danger. Whereas the infected rat dies in a few days, the infected flea lives without food 5 to 14 days, and if it obtains blood may transmit plague 40 days after its infection. Few rats can be introduced to a ship with loads of grain, but the transport of fleas has been demonstrated at Batavia. If periodical "deratization" under the control of an international commission were to become the rule the quarantine measures could be relaxed. The ideal is rat-proof houses and warehouses, but in the Dutch East Indies this ideal will not be attained for half-a-century.

No measures are taken in the Dutch East Indies against yellow fever, for it is believed that the Americans will do all that is needful.

BRUNET (F.). **Protection sanitaire maritime contre le typhus exanthématique par les savons parasiticides servant également à l'eau douce et à l'eau de mer.**—*Arch. Méd. et Pharm. Nav.* 1924. Sept.–Oct. Vol. 114. No. 5. pp. 350–356.

The author has written several papers on this subject. His oxycyanide of mercury and petroleum soaps are made thus:—

In a capsule heated on a water-bath place 1,000 gm. of white grated Marseilles soap and mix till the consistency is that of a homogeneous fluid paste. Dissolve 20 gm. of oxycyanide of mercury in 20 gm. of distilled

water. Pour the solution into the soap paste, mix intimately and run into a mould lightly covered with white vaselin. Keep in impermeable paper.

Melt on a water-bath 650 gm. of white Marseilles soap, adding 25 cc. of water till the consistence is pasty. Liquefy at a gentle heat 100 gm. of yellow wax and add 250 gm. of petroleum. Mix the wax and petroleum solution with the melted soap so as to obtain a homogeneous mass which is run into a mould while it is still warm.

These soaps dissolve in salt water as well as in fresh and yield an abundant lather. Brought into contact with them lice die in a short time. The water should be warm and in as small quantity as possible. The oxycyanide is expensive and this soap can hardly be entrusted to ignorant persons or children ; it is without smell. Petroleum is cheap enough and can be left at the disposal of anyone ; it is the soap of choice for emigrants and the poor. Neither soap causes any change in substances to which it is applied ; they are neither caustic nor irritant. To make sure of the destruction of nits the soap should be left in contact for about ten minutes and applied for three days in succession at least ; a fine comb is used between the applications. The clothes are treated as well, and to ensure the insects being reached it may be necessary to unpick the seams. Any person on board ship can louse himself with no apparatus but a piece of soap and a little water. The soap should be kept in its impervious covering in a place that is dry and not too warm. Persons exposed to contagion should use these soaps daily.

[Reliance on such a method would be risky if the user had no great desire to rid himself of his parasites.]

GAUTHIER (Aimé). **Essais de vaccinations par la voie buccale contre la fièvre typhoide.**— *Ann. d' Hyg. Publique, Industrielle et Sociale.* 1924. June. N.S. No. 6. pp. 347–353.

The writer gives three instances in small towns in Greece, namely, Kakossalessis, Vassilikos and Filla, where a mixed vaccine of typhoid, paratyphoid A and B and cholera was given to the population by the mouth instead of hypodermically. Epidemics of typhoid which were rife in all the places at the time rapidly came to an end. He strongly recommends this method in places where the inhabitants fear or object to the hypodermic syringe.

ELDRIDGE (E. F.). **The Iodine Content of Michigan Water Supplies.**— *Amer. Jl. Public Health.* 1924. Sept. Vol. 14. No. 9. pp. 750–754. With 2 figs. [5 refs.]

The importance of the quantity of iodine in water is becoming recognized on account of the possible relation with goitre in a population. This paper deals with the subject in America. Two maps show the iodine contents of parts of the United States and the State of Michigan. We give the details of the estimation of iodine in water supplies in case it may be of use to those interested in water analysis.

" Method of Iodine Determination.—A chloride determination is first made on the raw water. Fifty litres of the sample are evaporated to a small volume after the addition of about six grams of normal sodium carbonate. If the chloride content is greater than about 60 or 70 parts per million, evaporation is stopped when a moist saline

mass is obtained. A considerable quantity of 95 per cent. alcohol is added to the evaporated solution and the mixture filtered. The residue is boiled three times with 95 per cent. alcohol, filtered, and the filtrates combined. Two or three drops of strong potassium hydroxide solution are added and the alcohol removed by evaporation. The residue is dissolved in a little water and the above repeated if necessary until the bulk of the chlorides are removed. If the chloride content is below 70 parts per million, the extraction with alcohol is omitted.

" The volume is adjusted to about 100 cc. in a 250 cc. glass-stoppered flask. If not already alkaline, 4 or 5 cc. of a saturated sodium bicarbonate solution is added. A solution of potassium permanganate (25 grams per litre) is added drop by drop until the permanganate colour persists. About 5 cc. of the permanganate solution is added in excess, and the flask placed in a dish of ice and the contents cooled below 10° C. Three cc. of carbon disulphide are then added and then 5 cc. of concentrated sulphuric acid, drop by drop, avoiding a rise in temperature. During the addition of the sulphuric acid the flask is shaken constantly to insure the iodine thus freed being taken up by the carbon disulphide.

" After the addition of the acid is complete, the excess permanganate is destroyed by a careful addition of hydrogen peroxide and the carbon disulphide drawn off by means of a separatory funnel. If the iodine is present in comparatively large amounts, small portions of carbon disulphide are added, thoroughly shaken with the solution, and drawn off until the extraction of the iodine is completed, or until the last portion of the disulphide shows no trace of pink.

" These portions are combined with the first extraction and the amount of iodine in the total determined colorimetrically by comparison with a standard carbon disulphide solution prepared by the same method from a solution containing a weighed amount of potassium iodide. A DuBoscq colorimeter with small cups can be used in the comparison of the colours.

" If bromides are present, a brown colour is imparted to the carbon disulphide, in which case a weak solution of potassium sulphocyanate is added, drop by drop, with constant shaking until the colour is removed or is replaced by the pink colour of the iodine. The presence of chlorides does not interfere with the determination.

" The above method gave accurate results to one part of iodine in a billion parts of water, meaning that the colour produced by amounts of iodine as low as ·05 mg. in 1 or 2 cc. of carbon disulphide could easily be duplicated. As is true with most colorimetric analyses, the determination could be more accurately made in dilute solutions. Where amounts of iodine above 5 parts per billion were present, the volume of carbon disulphide was increased correspondingly."

GOODWIN (E. St. G. S.). **The Cockroach. 1.—Considered as a Possible Disseminator of Disease. 2.—Methods of Eradication.**—*Jl. State Med.* 1924. Oct. Vol. 32. No. 10. pp. 470–478. [14 refs.]

The writer deals with the subject of cockroaches on naval ships. His remarks are not intended to apply to holds of cargo boats. He deals with the various remedies, all of which have been mentioned at one time or another in reviews in these Supplements.

The cockroach " is plentifully supplied with ectoparasites in the form of arachnoids and insectae. Its intestinal canal affords a home to many others. It possesses its own endamoeba, in its stomach wall a gregarine may be encysted, four species of infusoria may be found in the gut, and also four nemathelminths including an oxyuris.

" Of these parasites we know nothing, but that discovered by Fibiger of Copenhagen appears to be of great importance. Briefly stated, his investigations led to the detection of an hitherto unknown nematode, *Spiroptera neoplastica*, encysted in the muscle substance of *P. americana*. By feeding laboratory rats on cockroaches infested with this parasite, or on larvae isolated from the muscles, he induced gastric carcinoma in 50 per cent. of them.

" Apart from this, the cockroaches must act as a mechanical carrier of pathogenic organisms. Its activities in this direction are as possible as those of the common house fly. Moyell published the results of some investigations which showed that the common cockroach is able by contamination with its faeces to: (1) Bring about the souring of milk; (2) infect food with intestinal bacilli; (3) to transmit the tubercle bacillus when fed on human sputum containing this bacillus; (4) to transmit destructive moulds."

As regards remedial measures, he considers that the only method of getting rid of the pest is a thorough " Claytonisation " on three separate occasions. Clayton gas is perfectly effective in killing the adult or living cockroach, but nothing has any effect on the packets of cockroach eggs. Consequently it is necessary to allow time for all these to hatch out and to expose the young insects to the gas. Sodium fluoride is quite useless except in a very dry atmosphere, which it is practically impossible to obtain in a ship.

WATER.

METROPOLITAN WATER BOARD. **Eighteenth Annual Report on the Results of the Chemical and Bacteriological Examination of the London Waters for the Twelve Months ended 31st March, 1924.** [HOUSTON (Alexander), Director of Water Examination.]—89 pp. With 15 diagrams & 35 photographs. 1924. London: P. S. King & Son, Ltd., 2 & 4, Great Smith Street, Westminster. [Price 15s.]

" *Barn Elms Experiments.*—There are nine primary rapid filters at Barn Elms, and they have been kept under observation since January, 1923. It should be explained that the main reason for their installation was to save the construction of new and costly slow sand filters by using the rapid filters to do, what may be called, the heavy work, thus enabling some of the existing slow sand filters to be worked more rapidly than usual.

" For the year ended March 31st, 1924, the slow sand filter beds Nos. 17, 18 and 19 receiving the combined filtrates from the primary rapid filters, were worked at 1·83, 2·52 and 2·75 instead of 1·19, 1·72 and 1·83 gallons per sq. ft. per hour, respectively.

" Eighty-one samples were collected during the year from these three filters (Nos. 17, 18 and 19) and 88·9, 85·7 and 88·5 per cent. of them contained no typical *B. coli* in 100 cc., which compares favourably with 73·1 per cent. from the West Middlesex Works as a whole.

" The Barn Elms reservoirs have always been a source of embarrassment, as the water is often so rich in ' plankton ' that the filters fed with this water used to choke with great rapidity.

" As judged by laboratory tests, the primary rapid filters did excellent work in removing most of the growths and suspended matters generally. The resistance to filtration experiments indicated over a hundred per cent. improvement, and one has only to compare photographs before rapid filtration with photographs after filtration to realise the truth of these remarks. Moreover, Nos. 17, 18 and 19 sand filters had only to be cleaned four, three and three times during the twelve months, despite increased rates of filtration of about 54, 47, and 50 per cent. respectively . . . . "

Some interesting photographs are shown of sand particles at Barn Elms and Hampton Works. The appearance of the *clean* sand used for filling the primary filters Nos. 7, 8 and 9 at Barn Elms is contrasted with a batch of the same sand taken from filter No. 8 after it had been in operation for filtration purposes for a long time. The " mature " sand, though it had been thoroughly washed at the works in the ordinary way and rewashed carefully in the laboratories before being photographed, presents a furry appearance, which is very striking in comparison with the *clean* sand before subjection to any filtration process. Other photographs show some surface sand from a slow sand filter at Hampton after washing and careful treatment with alkalis and acids and further washings. The useful " fur of maturity " is seen to persist to a considerable extent, even after such treatment. Lastly, there is a photograph of some sand taken from immediately below the surface layer which is removed for washing purposes. Here again a protective surface film or " fur " has formed. The writer regards this " fur of maturity " as of great importance from the point of view of purification and " is desirous of creating the impression that the sand in the filter beds is not really dead matter, operating solely in relation to its physical properties as ordinarily understood, but so far as its surface area is concerned, a ' mature ' and vital force producing effects not to be measured merely by the spaces existing between contiguous particles. The writer believes that the ' fur of maturity ' is not only mechanically but vitally operative."

" *The Taste of Chlorinated Water.*—The difficulties of chlorinating some waters without giving rise to a taste are too well known to need description. Taste cannot be measured, and in many cases when there is no appreciable taste there may be a latent one lurking, so to speak, in the background, and only waiting for some slight alteration in the conditions to become at once apparent.

" The ability to detect with delicacy a taste in waters is a natural gift, one might almost say it cannot be acquired. It requires, to be really useful, long experience, good judgment and a retentive memory. The observer who can anticipate complaints by detecting the dawn of taste troubles before they have become appreciable to others is worth a great deal.

" It is useful sometimes to review our knowledge, or lack of knowledge, of this important subject. There are three fairly distinct tastes, chlorinous, iodoform (chemist's shop flavour), and a third which drifts into a number of channels and may be called the ' indeterminate ' taste. Earthy, mouldy, damp straw, froggy and bricky are some of the terms applicable to the ' indeterminate ' taste. Some think they all merge into each other and are one and the same,

others regard them as practically distinct. The latter can often use their tasting abilities and memory with telling effect, and say, perhaps—this is the same mouldy taste we had three years ago with such and such a water. Untreated waters may have them to some extent, but usually it requires the presence of chlorine as well to draw out their characteristics.

" Let us take the *chlorinous* taste first. If you add enough chlorine to a water, say two or three parts per million, the taste is frankly and solely chlorinous ; or if there are other tastes as well they are completely subordinated. It is decidedly unpleasant, but not probably so nauseating as the iodoform taste. The more chlorine you add the more insistent the taste naturally becomes, but the more certain is it that the iodoform taste is avoided. If the dose is pushed to 100 parts in 1,000,000 the water is undrinkable and simply reeks of chlorine, yet after de-chlorination it becomes immediately tasteless—that is in the laboratory, for it is impossible to be quite certain that under practical outside conditions the same necessarily applies. Super-chlorination and de-chlorination methods have yet to be tried under all the variable conditions which might arise (*e.g.*, before and after filtration), and with all classes of water before we can be positive on this point. Nevertheless, so far as we can judge by laboratory and, to some extent, outside experiments, the only danger of super-chlorination and de-chlorination is lack of boldness in pushing the treatment far enough. Boldness is indeed the best antidote to taste troubles.

" If the writer had to give an Eastern potentate, with the powers of life or death in his hands, a drink of chlorinated water, he would choose a dose of 10, if not 100, parts per 1,000,000, and de-chlorinate rather than risk much smaller doses and iodoform taste and highly unpleasant if not fatal consequences. Frankly, however, it is unsafe to generalise from experiences gained chiefly, although by no means entirely, in the laboratory, as to what would inevitably follow in actual water-works practice.

" Permanganate does not remove a chlorinous taste ; on the contrary, the tendency would be to render it more pronounced. Permanganate is in some ways a double-edged sword. It has *per se* an objectionable taste, and unless used with great discretion may actually augment taste troubles. Speaking generally, a chlorinous taste is simply a taste of chlorine, and not a taste produced by the action of chlorine on other substances.

" Passing next to the *iodoform* taste, we have here to face a host of perplexing factors. It is apt to be associated with minor doses of chlorine, but shows a tendency sometimes to merge into the chlorinous taste. Still, in the main, it is quite distinct, and can be removed by substances (*e.g.*, permanganate) which do not destroy and may increase the chlorinous taste. It seems to be produced by the action of chlorine on substances about which little is known. By filtering water through a Berkefield filter, or by the addition of traces of phenol bodies the water may be so modified as to re-act with chlorine in such a way as to produce with tolerable certainty an iodoform taste. Waters containing very little oxidisable matter (*e.g.*, well water) appear to be specially sensitive, so that it cannot be said that it is merely a question of chlorine acting on organic matters. There may be no taste at a Works, or in the large mains, yet at the periphery of the system of supply crops of quite genuine complaints may arise.

"Some years ago, Dr. Snell, of Coventry, showed the writer the results of some ingenious experiments in which a chlorinated but tasteless water acquired a taste when various substances were placed in it (*e.g.*, portions of lead pipes and other water fittings taken from actual houses). A chlorinous taste can be instantly removed by a de-chlorinating agent, but the iodoform taste is not modified by such treatment. Permanganate can usually be relied upon to prevent its formation, or to remove it when it has actually occurred. Permanganate can be added successfully before or after chlorination, and either before or after filtration. Nevertheless, if the permanganate has been used up and the water still contains free chlorine, the chlorine may apparently act on fresh substances to produce the iodoform taste again. If permanganate is added previous to and chlorine after filtration, an iodoform taste may result, judged by experiments in the Laboratory. That is, the permanganate apparently cannot under these conditions so alter a water that it can never develop the iodoform taste when subsequently treated with chlorine. Chlorine in excess can also prevent, or remove, an iodoform taste, and if de-chlorination is practised, there is no taste of chlorine.

"Here, again, it might be imagined that if the iodoform taste were killed, so to speak, by means of chlorine, and then the water nearly, although not quite, fully de-chlorinated, that any trace of chlorine still left could not possibly create a subsequent iodoform taste. Yet, cases have been known when the distribution of such a water led to an iodoform taste peripherally, presumably through the chlorine encountering fresh substances capable of being acted upon so as to produce the iodoform taste.

"Lastly, as regards the '*Indeterminate*' taste, we are here on very uncertain ground, because we are dealing with tastes very similar to those which occur in untreated waters. They are not so common, or perhaps so objectionable, as the iodoform taste, and although some of them can be removed, or obviated, in much the same way, it must be confessed that others are of a most intractable character.

"The Board's Works were not designed for post-filtration chlorination methods, and, generally speaking, ante-filtration processes are alone permissible, but there are certain advantages in chlorinating subsequent to filtration. If carried out before filtration, the filter beds may be unsuspectingly *ad*sorbing taste-imparting materials, with the production subsequently of a long-drawn-out train of taste troubles.

"If the treatment is carried out subsequent to filtration there is no aftermath. If a taste develops and is corrected, only the water in the distributing system is implicated, and a few hours should suffice to put matters right. Nevertheless, it is possible, or even probable, that in certain cases where the taste is latent, incipient, or barely appreciable, the filtration process may just succeed in eliminating it; so it would be utterly wrong *unconditionally* to approve all post-filtration and discredit all ante-filtration chlorination processes. Moreover, there is irrefutable evidence that some waters are *more* susceptible to taste *after*, as compared with *before* filtration. The writer thinks that there is no royal road which avoids all taste troubles in all circumstances, and that each particular case should be judged on its own merits. It may be said, why not give a dose so small as to avoid chlorinous, iodoform and 'indeterminate' tastes? The answer is, that you are running the almost certain risk of not sterilising the water satisfactorily at all. The writer thinks that at some places

this is what actually occurs, and at others, the fear of it happening leads to a tightening of the dose just sufficiently to make it almost certain that the iodoform taste will develop.

" The foregoing notes show some of the difficulties of the subject, and perhaps they also indicate certain ways of avoiding taste troubles.

" There is one thing certain, and that is, although we have gradually gained most valuable experience, *further knowledge is urgently required.*"

Mom (C. P.). **The Taste and Smell of Drinking-Water sterilised by Chlorine.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1924. Part III. pp. 249–270. [14 refs.]

This paper contains a very exhaustive account of the occurrence and treatment of tastes and odours in drinking waters, whether of natural origin or arising from chlorination, and deals with many which occur only in tropical countries. Naturally, the writer makes many comparisons with the work done by Sir Alexander Houston on the same subject. One substance he describes as follows :—

" Again, there is still another substance which we meet with especially in the water of East Indian rivers which carry with them so much mud, washed down by rain water from the earth's surface ; this is the substance carrying the smell of earth. This substance which was isolated in the year 1895 by Rullmann from pure cultures of *Actinomyces odorifera*, and which is also produced by other micro-organisms belonging to the Streptotrichea—*e.g.*, the *Streptothrix chromogena*, described by Beyerinck—is a volatile insatiate carbohydrite which can be detected by its taste and smell, even in extremely small quantities. It comes into being during the formation of the humus, and therefore occurs exclusively in the topmost layers where this process takes place."

He makes use of ordinary chlorine from cylinders and a substance " caporit," which is described below.

" Another method of sterilisation by chlorine which is very promising for the future is that by means of *Caporit*. This preparation, put into the market by the firm Bayer (Griesheim-Electron), contains calcium hypochlorite and has then, in its chemical composition, a resemblance to bleaching powder ; but, unlike the latter, it keeps well and in its practical utility leaves nothing to be desired. This preparation contains ± 70 per cent. of so-called ' active chlorine,' is easily soluble, and its dosage is very simple, so that the use of this compound offers diverse practical advantages over the use of chlorine gas. It is certain that, next to chlorine gas, it will take an important place in chlorine sterilisation. Further on we will return to the use of caporit."

Those interested in water analysis abroad should obtain the original paper ; the experiments are too long to describe here. The conclusions, however, are given :—

" 1. The Tjiliwong water at Manggarai has naturally more or less of a strong taste and smell, which at best can be described as ' muddy.'

" 2. A matter having identically the same smell is produced by different kinds of streptothrix, such as the *Streptothrix chromogena*

and the *Actinomyces odofera* [*sic*]. This matter occurs in the superficial layers of the ground and very probably is washed down into the river together with mud, by rain water.

"3. In the Tjiliwong water there is nothing to be seen of the influence of algae or the growth of diatoms.

"4. Water having this muddy taste and smell is unsuitable for chlorination alone, even because a minimum dose of chlorine has a very unfavourable influence on them.

"5. An exact coagulation of the colloidal mud present in the river water contributes greatly towards the elimination of the substance causing the muddy smell.

"6. Since this smell-producing substance as a rule is not found in water which comes from somewhat deeper strata, *e.g.*, in well and in spring water, there is a certain parallelism to be expected between this substance and a nitrite which disappears in the lower strata, and is oxidised to a nitrate. It is to be supposed, as the smell giving substance is organic in kind, that it is converted by a process of oxidation, just like the nitrite, in the same zone underground where the oxidation of the nitrite has taken place.

"7. This hypothesis is confirmed in so far as the addition of oxidising matters to the water contributes to the elimination of the substance causing smell.

"8. In this capacity, potassium permanganate, in a dose of 0·5 mgr. per litre, is the most satisfactory (1 Kg. $KMnO_4$ costs about 1s. 8d.,—the expense, then, for 1 cubic metre of water is 0·01 of a penny).

"9. The stronger taste and smell which arises in chlorination can still continue in over- and anti-chlorination. Oxidation of the substance with the muddy smell, by means of over-chlorination, gives no gratifying results.

"10. The substance with the muddy smell being volatile, aeration contributes to its expulsion. In the experiments described here, aeration after filtration was sufficient. Eventual aeration, also before filtration, would probably have a favourable effect. In this respect, it may be mentioned that manufacturers of chlorine gas apparatus place on the market 'aerators' or 'desodorisers.' Of these, Patterson (England), Wallace and Tiernan (America), and Triton-Ornstein (Germany) may be quoted. Aeration alone, however, is in many cases, unsatisfactory."

LONGLEY (F. F.). **Chlorine as a Criterion of Impurity in Water. An Australian Variation from Accepted Principles.**—*Health.* Melbourne. 1924. July. Vol. 2. No. 4. pp. 110–116. With 1 chart in text.

Nowadays, as chlorine is used for sterilization purposes, we think it would have been better if the term "chlorides" had been used in this article instead of "chlorine." The writer quotes the work done by the Massachusetts Board of Health on the chlorides contained in the water in certain States of America; the quantity found varied with the distance from the sea. Similar work has been done in

Australia, and the results were extraordinarily erratic. The main discussion turns on the query how it comes about that these high chloride figures are obtained in rain water some distance inland. This is a meteorological problem, and not a sanitary one at all. The significance of chlorides in a water supply is so difficult to estimate that it is not used much by most water analysts.

CUNNINGHAM (J.) & RAGHAVACHARI (T. N. S.). **Note on the Appearance of a Violet Producing Organism in Certain Water Supplies of the Madras Presidency.**—*Indian Jl. Med. Res.* 1924. Apr. Vol. 11. No. 4. pp. 1285–1289. [1 ref.]

The writers describe the chromogenic bacteria occasionally found in the Madras waters which produce a violet colour. The microscopical appearance, staining properties and culture tests are given in detail; those requiring them should refer to the original paper. The most interesting fact from a general point of view is that these bacteria made a simultaneous appearance in three places in the Madras Presidency many hundred of miles apart. Further, the bacillus persists in these various supplies and has been isolated on several subsequent occasions.

This phenomenon has never been explained. The same thing was reported by the reviewer and his collaborators in 1908, when at one season of the year a large number of the water supplies in the Presidency contained bacteria which fermented inulin; they disappeared as rapidly as they came. Other incidences could be enumerated.

PUBLIC HEALTH REPORTS. 1924. Nov. 7. Vol. 39. No. 45. pp. 2788–2791.—**Some Specific Factors responsible for Pollution or affecting Analyses of Water Supplies.**

This list of factors was originally (1922) submitted by Mr. H. A. WHITTAKER to the sub-committee on field surveys of the Advisory Committee on Official Water Standards of the U.S. Public Health Service. Though naturally it contains much that is well known, it may be of service to those employed in the supervision of water supplies.

A. SOURCE OF SUPPLY.

" *Surface and underground supplies*:

" (*a*) The selection of water supplies without complete hydrographic and sanitary data.

" (*b*) The location of waterworks, including pumping station, treatment plants, reservoirs, etc., where they are subject to flooding with surface water from lakes, streams, and other sources, or where satisfactory drainage cannot be established away from the plant on the ground surface.

" *Underground supplies*:

" (*a*) The presence of sewers, cesspools, wells used for the disposal of sewage and surface drainage, etc., in close proximity to the source.

" (*b*) Excavation work in the immediate vicinity, especially where explosives are used, which would result in disturbance of the underground formations.

" (*c*) Defective casings resulting from incorrect design or construction and the deterioration of materials. The tops of drilled-well casings are frequently fractured during the process of removing the drop pipe and cylinder for repairs.

" (*d*) The lack of covers to wells and springs, or the improper design and construction of covers, especially of dug wells and springs, and of the caps for casing of drilled and driven wells.

" (*e*) The location of pumps and pumping equipment in a pit immediately over or adjacent to the well or spring casing where such design and construction could be avoided. Such pits act as catch basins for drip water from the pump and piping, and sometimes for surface water which may enter the pit through defective side walls or covers where pumps of the deep-well type are used. Unless provision is made for proper removal of this water, it may accumulate to a sufficient extent to flood the casing head or the pumping equipment, thus endangering the supply.

" (*f*) The construction of drains leading from a well or pump pit to a sewerage or drainage system. Such drains establish a direct connection between the water supply and a source of pollution.

" (*g*) Inadequate protection of air vents from wells using air-lift pumps.

B. Treatment.

" *Surface and underground supplies* :

" (*a*) The design and construction of water-treatment plants, including filtration plants, chlorine plants, and water-softening plants, without adequate knowledge of the microscopic, bacteriological, physical, or chemical condition of the water to be treated, or sufficient preliminary experimental data to demonstrate the proper type of plant to install.

" (*b*) The installation of only a part of the treatment necessary to purify the water properly. This is especially true where chlorine treatment has been recommended when filtration should have been a part of the treatment to ensure satisfactory results.

" (*c*) The improper design or construction of settling basins, coagulation basins, filters, piping, and apparatus for administering chemicals.

" (*d*) The existence of by-passes around all or a part of the water-treatment plant by which untreated, or partially treated water, can be discharged into the distribution system.

" (*e*) A lack of duplicate parts of machinery and apparatus involved in the treatment of the water, and necessary to keep the plant in operation in case of accidental breakdown. This applies especially to chlorine apparatus.

" (*f*) The intermittent discharge of sewage and trade wastes into the source of supply, placing an unusual burden on the treatment plant at irregular intervals.

" (*g*) Defects in the design and construction of water-softening plants that expose the water under treatment to possible pollution, especially through the application of the chemicals.

C. Pumping Equipment.

" *Surface and underground supplies* :

" (*a*) The use of a type of pump of unsatisfactory construction, as, for example, one which would require a well pit around the well at the

surface when another type of pump would have obviated the necessity of such construction, or the use of one which requires priming when put in operation, or which requires the attendant to enter the well for the purpose of oiling.

" (*b*) The return of water used for cooling engines or pump bearings into the supply.

" (*c*) The improper location of intakes to air compressors which would result in pumping dust-laden air into a well operated on the air-lift principle.

D. Storage.

" *Surface and underground supplies* :

" (*a*) The lack of covers to prevent contact with persons, animals, birds, insects, dust, etc.

" (*b*) The use of the covers or surfaces of underground reservoirs for pleasure purposes, such as play-grounds, tennis courts, skating rinks, etc.

" (*c*) Faulty construction of walls and roof.

" (*d*) Manholes in the roofs constructed without collars, permitting the entrance of surface water, and the use of covers without overlapping edges.

" (*e*) The use of improperly constructed vents in the roof, permitting the entrance of small animals, birds, insects, dust, etc.

" (*f*) The improper design of drainpipes and overflow pipes which would allow the backing up of sewage or other polluted material from a sewerage or drainage system to which the drain or overflow is connected.

" (*g*) Passing water pipes carrying polluted water through a storage reservoir, or a clear-water basin of a filtration plant, thus creating a possible opportunity for polluting the supply in case of leakage.

E. Distribution.

" *Surface and underground supplies* :

" (*a*) The existence of cross connections between the distribution system and another water supply which is unsafe.

" (*b*) Connections with mechanical equipment receiving and returning water to the system.

" (*c*) Plumbing fixtures which allow water to return to the system from polluted sources during periods when there is a negative pressure in the system.

" (*d*) Connections between the distribution system and the bottoms of elevated water tanks where such tanks are subject to pollution.

" (*e*) The practice of connecting fire engines with the distribution system and pumping water from polluted sources into the system for fire-fighting purposes.

" (*f*) The laying of water mains in the same trench with sewers, the water mains being laid at a lower elevation than the sewer pipe. This adds unnecessary danger in case breaks occur in the water system and it is necessary to drain the pipes for repair. If leakage occurs in the sewer pipe, or if it is accidentally broken during excavation, there is opportunity for sewage to enter the water mains.

F. Operation.

"*Surface and underground supplies*:

"(*a*) The operation of water works by inexperienced operators with little or no knowledge or appreciation of sanitation.

"(*b*) Careless operators who do not observe difficulties, and who do not repair breaks in equipment, including well casings, suction pipes, pumps, chemical feed apparatus, chlorine apparatus, etc.

"(*c*) The operation of water supplies without analytical control. This applies especially to water-treatment plants.

"(*d*) Neglect to disinfect any part of the system handling pure water after repair work on wells, pumps, piping, filters, clear-water basins, reservoirs, tanks and distribution system, etc."

Brownell (O. E.). **Protection of Small Water Supplies used by Railroads.**—*Public Health Rep.* 1924. Sept. 5. Vol. 39. No. 36. pp. 2283–2292. With 9 figs.

The pictures (Figs. 15–22) attached to this most excellent article explain themselves. Examples are given of defective well structures, with suggestions for remedying the evils.

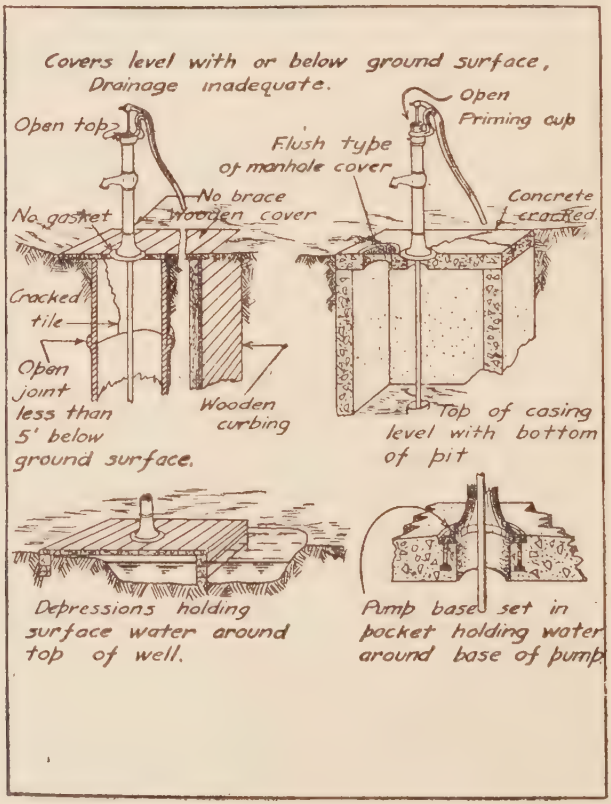

Covers level with or below ground surface, Drainage inadequate.
Open top
No gasket
No brace
Wooden cover
Cracked tile
Open joint less than 5' below ground surface.
Wooden curbing
Open Priming cup
Flush type of manhole cover
Concrete cracked
Top of casing level with bottom of pit
Depressions holding surface water around top of well.
Pump base set in pocket holding water around base of pump

Fig. 15.—Some defects frequently found in well covers and pumps.

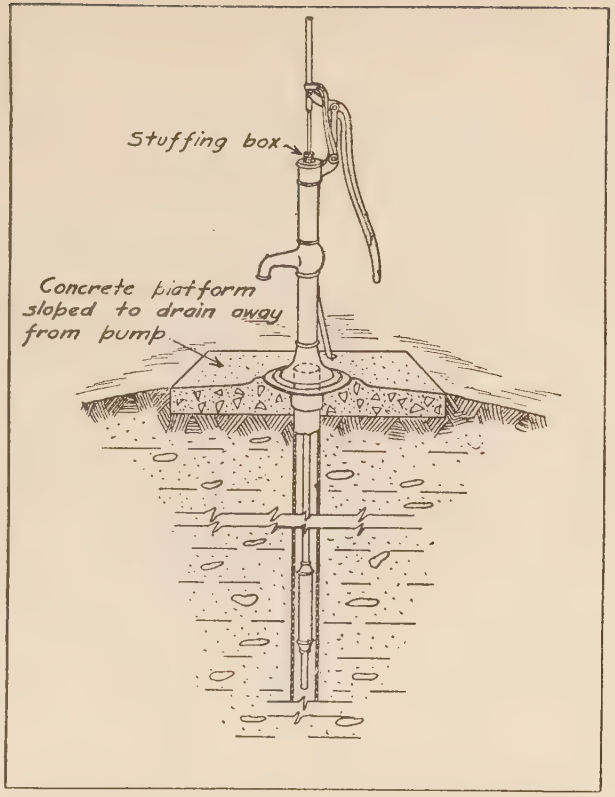


Fig. 16.—A properly constructed drilled well.

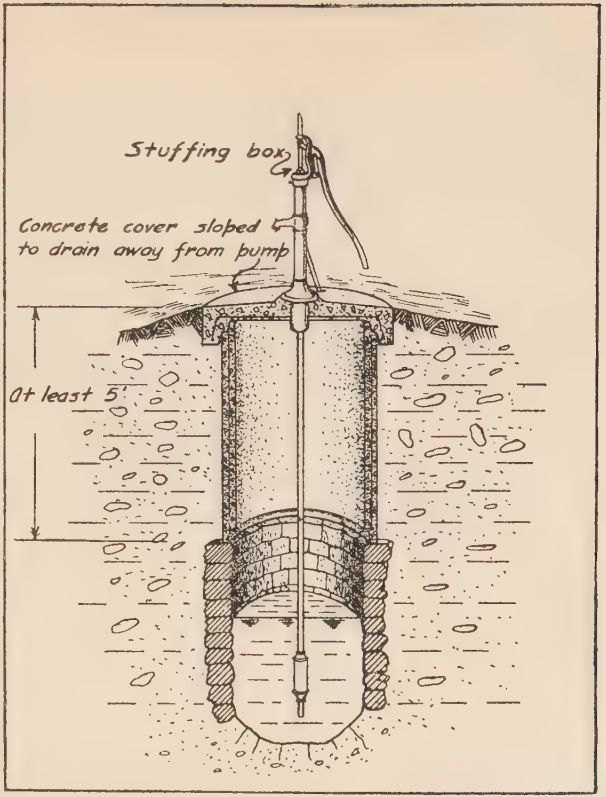


Fig. 17.—Properly reconstructed dug well.

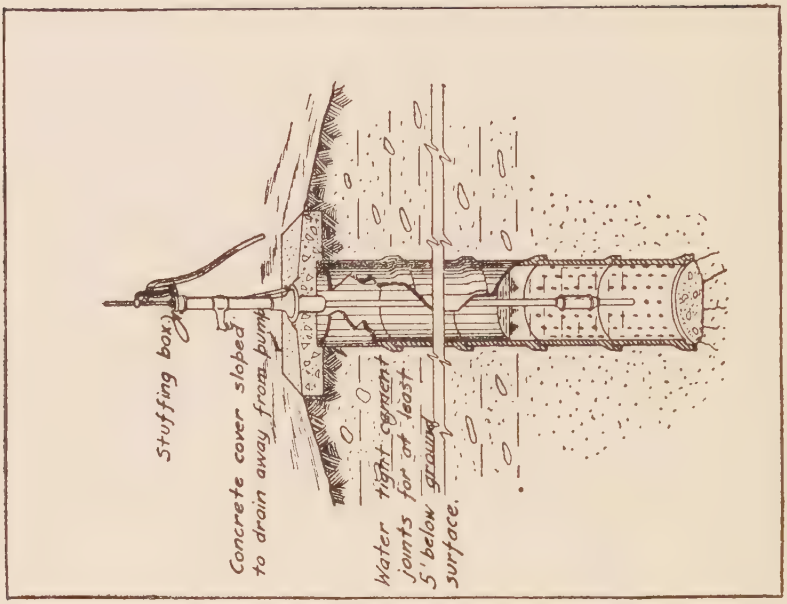


Fig. 19.—Properly constructed bored well.

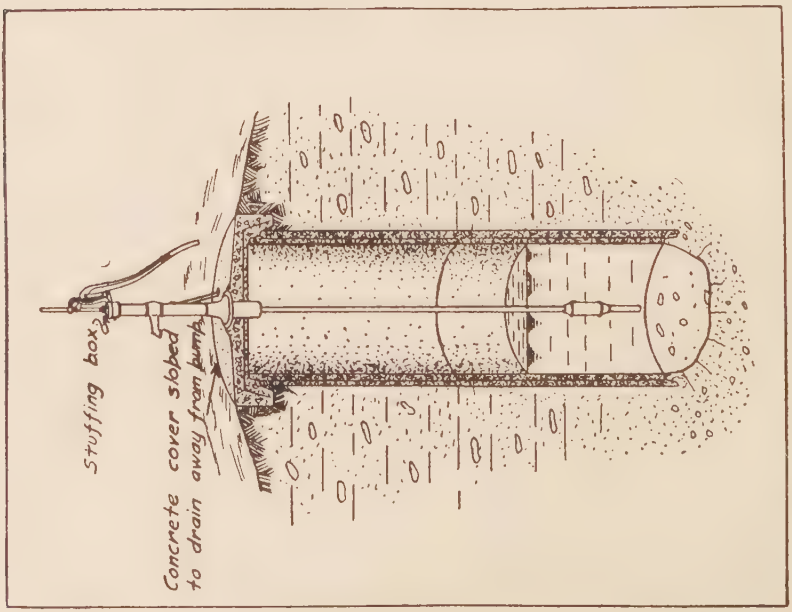


Fig. 18.—Properly constructed dug well.

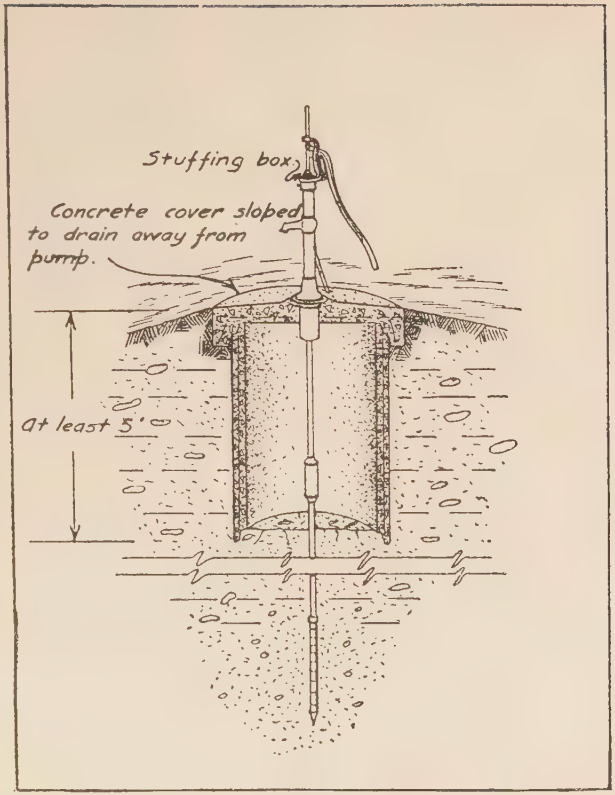


Fig. 20.—Properly constructed driven well.

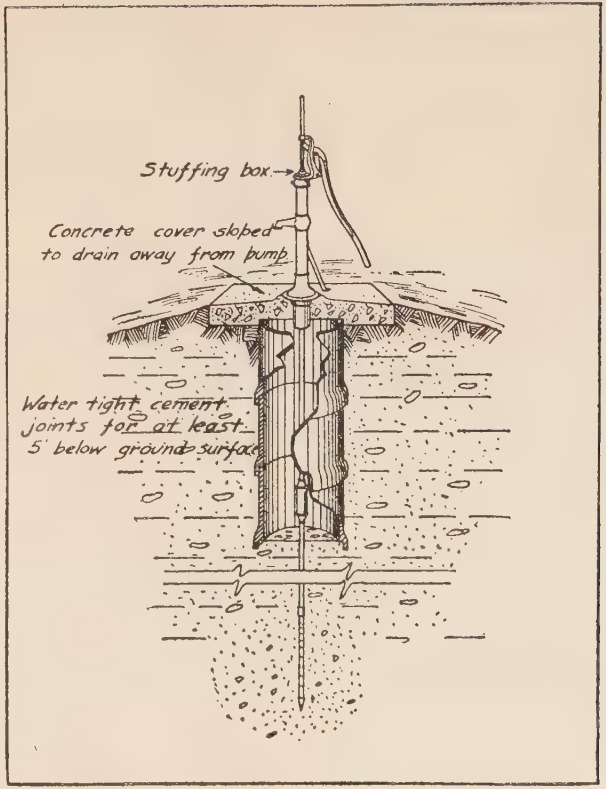

Stuffing box
Concrete cover sloped to drain away from pump
Water tight cement joints for at least 5' below ground surface

Fig. 21.—Properly constructed driven well.

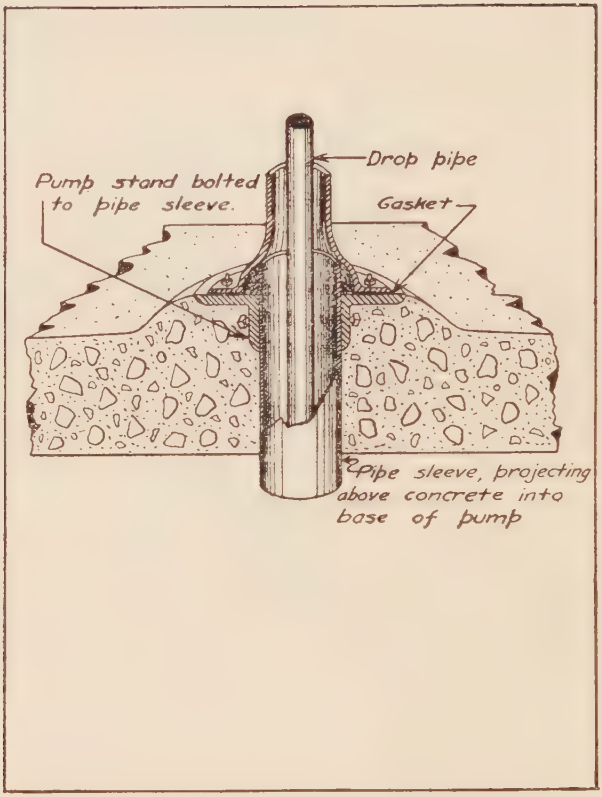


Fig. 22.—Detail of construction at base of pump.

[Figures 15 to 22 are reproduced from *Public Health Reports*, Washington.]

HOOVER (Charles P.). [**Mixing Devices and Reaction Time.**]—*Jl. Amer. Water Works Assoc.* 1924. May. Vol. 11. No. 3. pp. 582–597. [Summarized in *Public Health Engineering Abstracts.* 1924. July 26. J.–848.]

"Water treatment experiments were made in 1923 at Columbus, Ohio, water works plant to determine: (1) Velocities required to keep the precipitated chemicals in suspension; and (2) the effects of short and long periods of mixing and agitation. A turbid water was used with aluminum sulphate only, and also a hard water, with lime, soda-ash and alum treatment. The results of plant operation and the laboratory experiments indicate the following:

"'1. Results of plant operation and laboratory experiments indicate that velocities of 0·3 foot per second do not provide sufficient agitation for treatment of turbid water or for water softening, but that the velocity does not need to exceed 0·6 foot per second.

"'2. Coagulation results obtained on turbid water at velocities of 0·6 foot per second may be obtained at lower velocities only by adding an excess amount of coagulant.

"'3. A short mixing period of twenty or thirty minutes at 0·6 foot per second velocity is more effective than a mixing period of one and one-half hours at 0·3 foot per second velocity.

"'4. Mechanical agitators are less expensive to build, more compact, obviate the necessity of lifting the water the extra two or three feet necessary to pass through baffled mixing tanks and provide greater flexibility and accessibility.

"'5. Temperature is a more important factor in water softening than time.

"'6. Waters containing magnesium salts are more difficult to soften than waters containing only calcium, magnesium carbonate being especially hard to remove.

"'7. Magnesium salts may be precipitated by overtreatment with lime.

"'8. By overtreatment with lime, then neutralizing the excess lime with sodium carbonate, waters having a hardness of 572 to 1,044 parts per million may be reduced to a hardness of less than 30 parts per million, or less than 2 grains per gallon.

"'9. If it is not desirable to use excess treatment, better water softening results are obtained by split treatment than by the ordinary method of applying all the chemicals to all the water under treatment.'

"Professor Langelier, of the University of California, in a discussion of this paper, refers to results of experiments and tests at Sacramento and other California filtration plants. His experience indicates that temperature alone does not have an important effect on coagulation of water with alum."

BASTIN (E. A.). **A New Pump or Liquid Elevator.** [Correspondence.] —*China Med. Jl.* 1924. June. Vol. 38. No. 6. pp. 529–530.

The Rev. E. A. Bastin strongly recommends a pump called the "Chaine-Helice Patent Liquid Elevator," which has been improved by Messrs. Boulton & Paul, Ltd., of Norwich, and put on the market as the "Boulton Water Elevator (Caruelle Patents)." We have written to this firm direct and give here for the benefit of those interested in this subject some pictures and diagrams illustrating the essential principle of the Caruelle Cells as used in this water elevator.

Figure 23 shows the formation of the Caruelle Cells, which are made in a continuous line or lines on an endless driving band which passes over a pulley at the well-head and under a heavy pulley wheel below the surface of the well-water. The Caruelle Cells are so shaped and proportioned as to allow water freely to enter them when the driving band passes through the well-water at high or low speed. The water they take up is retained by surface tension so long as the direction of the driving band remains in a vertical line, even though it is stationary. When the band is tilted from the vertical, as in passing over the top pulley, the water is released from the cells by centrifugal force, which breaks down the surface tension. By fitting a tank under the top pulley as shown in Figure 24, the released water is caught and prevented from returning to the well.

Figure 25 shows a portion of the band fitted with Caruelle Cells held vertically and filled with water from a vessel into which it has been dipped; figure 26 shows the band held at an angle and the water running out.

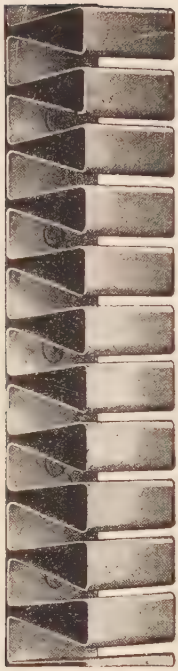


Fig. 23.—Showing formation of the Caruelle cells.

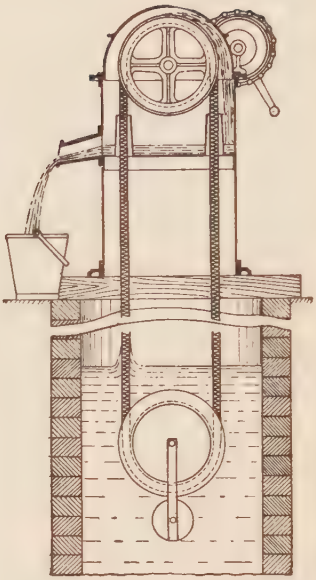


Fig. 24.—Diagram of elevator head used with Caruelle bands.

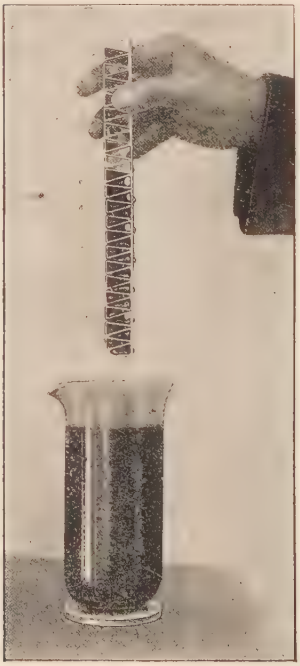


Fig. 25.—Showing a piece of Caruelle band filled with water which it has picked up from the beaker.

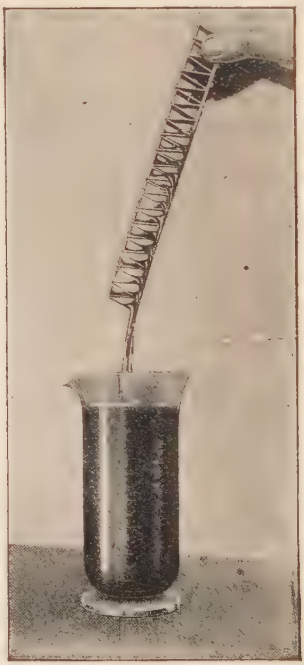


Fig. 26.—Showing the water running out of the cells when the band is held at an angle.

[Figures 23 to 26 are reproduced from blocks kindly lent by Messrs. Boulton & Paul, Ltd., Norwich.]

FOOD.

Smith (Wm.). [**Urban Milk Supply in India.**]—*Local Self-Govt. Gazette.* 1924. May. Vol. 10. No. 5. pp. 166–167. [Summarized in *Public Health Engineering Abstracts.* 1924. Aug. 16. J–868.]

"The author discusses briefly the insanitary and filthy conditions of the milk supply in the larger cities of India. The milk offered for sale is so unsafe that practically every consumer is forced to boil it. The cows are housed within or very close to city limits. Space is restricted for grazing or proper exercise. The back lanes of Bombay, Madras and Calcutta, where the bulk supplies of these cities is produced, are very insanitary and filthy.

"The author states 'that the Indian milk supply must be produced under natural conditions on the farms where the cattle are kept, remote from the cities. It must be pasteurized, cooled and railed to the cities and there sold under sanitary conditions to the public, and until this system is introduced there is little hope of any permanent improvement.' The Governor of India, realizing that the need of the dairy industries in India is technical knowledge and business organization, has provided an up-to-date dairy institute at Bangalore. All interested in the milk question are urged to attend this institution."

CONSERVANCY.

Khalil (M.). **The Relation of Sewage Disposal to the Spread of Helminth Infections in British Guiana. (A Report of the Filariasis Commission in British Guiana.)**—*Jl. Helminthology.* 1924. Sept.–Nov. Vol. 2. Nos. 4 & 5. pp. 175–190. With 8 figs. [11 refs.]

Dr. Khalil describes the pit latrine, the pail closet, the latrine erected over drainage trenches, and the septic tank, all of which are in operation in British Guiana. An examination of pit latrines, whether in use or filled in, revealed helminth ova; in the recent deposits were hookworm larvae and eggs, in the abandoned pits hookworm was absent, and it is suggested that the larvae had migrated into the adjacent soil. Pit latrines are also dangerous as breeding-grounds for flies, as allowing sewage to percolate and pollute neighbouring streams, as liable to flooding, and as subject to the depredation of pigs and poultry. He acknowledges, however, that the pit latrine is an important advance on promiscuous defaecation. The pail closet is not much used in British Guiana.

Latrines erected over drainage canals, a common method in the canalized coast lands, have several disadvantages: excreta collect in the dry season, and are subject to the attention of flies and domestic animals; the ova of parasitic worms are deposited along the bank and have every chance of maturing; in heavy rains the canals overflow and pollute the neighbouring soil; in countries other than British Guiana (which is bilharzia-free) the spread of bilharziasis is favoured. Helminth eggs were not found in water from such trenches, and it has been suggested that dilution kills them. The determining factor in development, however, is access of oxygen. Looss suggested that larvae in water soon sink to the bottom, and therefore the drinking of open water is not a risk. Khalil suggests that the heating of the upper

layers by the sun enables the mature larvae to travel to the surface. It is concluded that it is unsafe to allow human excreta to drain into open trenches.

The septic tank has been considered an ideal solution of the sewage problem in the tropics, and has been credited with the destruction of hookworm eggs. A high percentage of the population harbours hookworm, and examination of septic tank effluents and deposit on 15 occasions revealed hookworm eggs which, put under favourable conditions (Petri dishes), developed. Active hookworm larvae, differentiated from free-living forms, were obtained in drains 18 to 20 feet from the septic tank from which samples of effluent were taken, and in these drains children paddle or fish. The delay in development in the tanks is due to want of oxygen. Tanks draining quarters used by Europeans gave no ova, but in 3 other instances over 2,000 Necator eggs per gallon were counted. A table for 18 tanks gives the capacity, number of adults served, eggs of Necator, Ascaris and Trichocephalus per gallon, other organisms in tank scum and oxygen absorbed. The author's conclusions are as follows :—

" Sewage disposal has been considered in England and Europe chiefly from the point of view of bacterial infection, particularly as regards the Enteric group of organisms. The Protozoal and Helminthic infections, propagated by faecal contamination, have received no attention. In text books on Sanitation and Hygiene, the entozoal parasites of man are dismissed in a few lines, mostly incorrect and copied from one edition to the next without keeping pace with the rapid progress in Tropical Medicine. There is a tendency in England to dissociate sanitation and hygiene of warm climates from that of cold climates. With the facilities of communications now available this distinction is unjustifiable. Tropical diseases are being introduced into colder climates and *vice versâ*. Moreover, this country contributes a high percentage of the medical men and sanitarians located throughout the tropics. They are apt to copy what is done or what they were taught in England, neglecting new factors appearing in their new environment. It is surprising that in British Guiana and elsewhere sanitarians have diligently made cultures to isolate *B. typhosus* and other organisms from drinking water and sewage effluent, and were totally unconscious of the presence of the comparatively gigantic ova of hookworm and other parasites. In tropical countries the disasters brought about by hookworm disease often surpass those due to bacterial infections. Hookworm disease retards the development of children, handicaps their mental capacity, deteriorates the value of adult manual labour, predisposes the community to various diseases, and, in addition, claims a grave toll of mortality.

" It is not to be concluded that bacterial investigation of water and sewage effluents is unimportant, but it is claimed that protozoal and entozoal infections must receive due attention as well.

" Bacterial purification of sewage is apparently inefficient as regards helminth ova. It is unjustifiable to turn the effluent from such installation into rivers or canals, which are used for drinking purposes, as is the routine in England. It should be kept in mind that filtration is inefficient in excluding hookworm larvae which are capable of passing through several layers of filter paper and can penetrate the human skin. Sewage farms ought not to be encouraged in the tropics, as they act as veritable concentrated cultures of hookworm larvae. One cannot wholly condemn these methods of sewage disposal, because

so far there is nothing better to replace them. It is only urged that their limitations must be kept in mind till further research and observations rectify their defects."

Faust (Ernest Carroll). **Some Facts regarding the Relation between Nightsoil Disposal in China and the Propagation of Helminthic Diseases.**—*Amer. Jl. Trop. Med.* 1924. Nov. Vol. 4. No. 6. pp. 487–501. With 1 plate.

It is unnecessary to do more than refer to the account here given of the Chinese methods of collecting human excrement, which in China, as is well known, is all carefully treasured for manure. In the author's opinion communicable organisms passed in this otherwise valuable material are responsible for most of the disease of China and the Far East. The author, however, here deals only with disease due to helminth infections. He gives details of the species of helminths infesting man in China, and also some particulars of some of the chemical solutions which destroy eggs that do not contain resistant larvae; but as such chemicals are not generally applicable to manure, we may pass on to his practicable recommendations for meeting the danger of helminth infections through the use of night-soil for agricultural and horticultural purposes, not only in China, but wherever the Chinese market-gardener has established himself.

Garden produce may be contaminated by direct contact with such manure, as also may water; no treatment is feasible other than adequate boiling. Where hookworm and schistosome larvae exist in the manure, since the labourer works in the stuff with bare legs, the original faeces should, if possible, be sterilized; and the only suitable method of sterilization at present to be suggested is thorough mixing of the faeces with the urine and allowing sufficient time for the mixture to ripen. Furthermore, in limited areas, where important "reservoir" animals are not present, hookworm (and also Fasciolopsis) infestation can be treated with carbon tetrachloride, and schistosome infestation with antimony tartrate. Theoretically, the discovery of some effective and non-deleterious method of sterilizing night-soil and the universal diffusion of appropriate knowledge would dispose of the danger of helminth infection. These certainly are counsels of perfection; experience would incline to regard the "educational" remedy as counsel of despair, though the author almost persuades himself to be hopeful.*

Pearse (Langdon). [**Dewatering Activated Sludge.**]—*Public Works.* 1924. Aug. Vol. 55. No. 8. pp. 262–264. [Summarized in *Public Health Engineering Abstracts.* 1924. Aug. 2. J–863.]

"This article is from a paper presented to the International Conference on Sanitary Engineering held in London July 7, 1924, and describes apparatus and methods employed in the United States, and the results obtained in operating and test plants.

"The difficulties of dewatering activated sludge are chiefly due to: (1) The physical condition of the solids, which retain very tenaciously the water; (2) the large volume of sludge to be handled; and (3) the importance of removing practically all the solids from the sludge.

"Briefly, the problem is to take a sludge containing from 98·5 to 99·5 per cent. water and reduce the water content to 80 per cent. or

* Summarized by Lt.-Col. A. Alcock.

less, the resulting cake being then heat-dried to a moisture content of 10 per cent. Various types of apparatus of treatment have been tried. These may be classified as follows :—

" *Primary Removal of Water.*—1. Air drying on prepared sand beds. 2. Filtering : (*a*) Through fine wire mesh (Machlachlan) ; (*b*) through filtros plates ; (*c*) through absorbent material. 3. Filtering with aid of additional pressure : (*a*) Hydraulic pressure applied to liquid ; (i) chamber of leaf filter press ; (ii) Kelly filter ; (*b*) hydraulic pressure applied to bags ; (i) Worthington ; (ii) Berrigan ; (*c*) vacuum filters ; (i) rotary leaf or American ; (ii) rotary drum of Oliver. 4. Centrifuge ; (*a*) intermittent ; (*b*) continuous. 5. Flotation. 6. Spraying (Bailey).

" *Secondary Removal of Water.*—1. Rotary Heat Dryer ; (*a*) direct ; (*b*) direct-indirect ; (*c*) steam. 2. Travelling Belt Dryers.

" Activated sludge de-watering is not so much a problem of finding suitable machinery as it is of properly conditioning the sludge itself. By conditioning is meant both the control of the activated sludge process as well as any supplementary treatment given by adding chemicals with or without heat."

Surveyor & Municipal & County Engineer. 1924. Oct. 24. Vol. 66. No. 1710. pp. 343–344.—**Sewage Purification at Manchester. Operation of Activated Sludge Units : Rivers Department's Annual Report.**

" Small Unit.—This unit has been in continuous operation throughout the year, with the exception of a short period of five days, when the flow of sewage to the plant was stopped to permit of the construction of a new sewage carrier, etc.

" A total volume of 128,215,000 gallons of sewage has been dealt with at the average rate of 357,000 gallons per day, with an average air consumption of 1·08 cub. ft. free air gallon of sewage treated.

" The average analytical returns, etc., for the year are tabulated below :—

Small Unit : Results in Grains per Gallon.

	Screened and Detritus-free Sewage.	Effluent.
Four hours' oxygen absorption	2·63	·45
Three minutes' oxygen absorption :—		
Before incubation	·88	·18
After incubation	—	·17
Putrescibility	—	3/304
Free and saline ammonia	1·69	1·59
Albuminoid ammonia	·50	·095
Nitrite (in terms of NH_3)	—	·01
Nitrate (,, ,, ,,)	—	·16
Chlorine	4·0	4·0
Dissolved oxygen absorption (*Royal Commission Test)	—	·45
Suspended Solids	7·6	·32
Volume of sewage treated (gallons per day) ...	... 357,000	
Air consumption :—		
Cub. ft. free air per gallon of sewage treated	... 1·08	
Average detention period :—		
Aëration tank capacity 60,000 gallons ...	... 4·0 hours	
Settlement tank capacity 27,000 gallons ...	... 1·8 ,,	

* Standard recommended, 1·40.

The average composition of the sludge (dry), as ascertained from fortnightly samples, was as follows :—

	Per cent.
Organic and volatile matter	69·1
Mineral matter	30·9
Nitrogen (as N)	6·0
Phosphoric anhydride (P_2O_3)	3·6

"During the 190 days' operation falling within the period September 11 and the year ending March 26, a total volume of 283,000,000 gallons of sewage has been successfully treated, at the average rate of 1,490,000 gallons per day, with an average air consumption of ·87 cub. ft. free air per gallon of sewage treated.

"The average analytical returns, etc., for this period of 190 days are tabulated below :—

LARGE-SCALE UNIT : RESULTS IN GRAINS PER GALLON.

	Screened and Detritus-free Sewage.	Effluent.
Four hours' oxygen absorption	2·25	·43
Three minutes' oxygen absorption :—		
Before incubation	·78	·19
After incubation	—	·18
Putrescibility	—	1/158
Free and saline ammonia	1·38	1·34
Albuminoid ammonia	·48	·095
Nitrite (in terms of NH_3)	—	·01
Nitrate (,, ,, ,,)	—	·16
Dissolved oxygen absorption (*Royal Commission Test)	—	·59
Suspended Solids	7·8	·62
Volume of sewage treated (gallons per day)	1,490,000	
Air consumption :—		
Cub. ft. free air per gallon of sewage treated ...	0·87	
Average detention period :—		
Aëration tank (capacity, 325,000 gallons)	5·2 hours	
Settlement tank (capacity 88,000 gallons)	1·2 hours	

* Standard recommended, 1·40.

"Running costs.—The power required for the operation of this unit is from 18 to 19 b.h.p. (measured at the switchboard) per million gallons of sewage treated."

FLOOD (G. M.). **Efficiency in Refuse Disposal.**—*Jl. State Med.* 1924. Dec. Vol. 32. No. 12. pp. 585–587.

The argument here is that the collection and disposal of refuse—a matter of infinite importance in the prevention of flies—should be the care of the engineer rather than of the M.O.H. Particularly so when disposal is by the ideal method of incineration, the full efficiency of which can be secured only by one who understands the construction and working of incinerators—a matter entirely within the engineer's province. Refuse is not the same everywhere. No small town should think of constructing an incinerator without knowing what weight of refuse has to be disposed of daily, and the nature of the refuse, par-

ticularly the estimated percentage of combustible matter and of water. The builder of the incinerator should guarantee both the efficiency and the economy of his design.*

Ball (Geo.). [**Motor Transport for Removal of House Refuse.**]—*Surveyor & Municipal & County Engineer.* 1924. Apr. 18. Vol. 65. No. 1683. pp. 381–382. [Summarized in *Public Health Engineering Abstracts.* 1924. July 19. J–840.]

"Some 50 replies to a questionnaire regarding refuse collection methods, sent to towns of 13–60,000 population [in England], are summarized. Of the 30 towns still using horse-drawn vehicles, 5 have experimented with various types of mechanical tractors, 4 have combined systems, and 7 are considering other types of vehicles. Twenty towns have adopted self-propelled vehicles of various kinds. It is concluded from consideration of the replies that where refuse depot is situated within 1 mile radius of centre of collection it is more economical to employ horse haulage, and when distance is greater than 1 mile mechanical traction is more economical."

SMALLPOX VACCINATION.

United States Public Health Service. **Health News.** [Mimeographed Circulars. A–13.]

"Some Interesting Side Lights on a Recent Epidemic of Smallpox.—Through the courtesy of the State Health Officer of the State of Minnesota, Surgeon General Cumming, of the Public Health Service, is able to furnish the following information with regard to an outbreak of malignant smallpox beginning in Minnesota in the early part of this year.

"The disease was introduced at Duluth in January, 1924. The first case was that of a male nurse, 54 years of age, who had never been successfully vaccinated, and who died within a few days. Subsequently there developed other cases, making a total of 182 for this epidemic. It is interesting to note that 139 of the persons who had smallpox had never been successfully vaccinated in their lives. Of these 139 persons who had never been successfully vaccinated, 34 died. Of the remaining 43 persons who had the disease, 39 had not been successfully vaccinated within seven years, and of these 39, 6 died. This leaves 4 cases still to be accounted for. Of these, 2 had been vaccinated in less than seven years, but did not die from the disease. Two others had had smallpox when they were children, and they recovered. Of those persons who died, although they had been once successfully vaccinated, we have the following histories: One woman, age 59, was vaccinated in childhood; one, aged 49, was vaccinated when 8 years old. One woman, 24 years of age, who was not in very good physical condition at the time she contracted the disease, had been vaccinated in childhood. One man, 37 years of age, had been vaccinated when he was three and a half years old. One man, 55 years of age, had been vaccinated when he was six months old. One man, who was 55 years of age, had been vaccinated when he was one year old.

* Summarized by Lt.-Col. A. Alcock.

"From these data, which have been very carefully collected, it will be seen that smallpox still runs true to form in that it attacks persons who are either not protected by vaccination at all or who have lost the protection which they once had.

"Smallpox has never occurred to any appreciable extent in persons who have been recently, successfully vaccinated."

LEGENDRE (J.). **Les épingles pour la vaccination antivariolique en série.**—*Rev. Méd. et Hyg. Trop.* 1924. May–July. Vol. 16. No. 5. pp. 133–134.

The writer makes an ingenious suggestion for using ordinary pins as scarificators for vaccine. The pins being put into a dish with a little alcohol, which is lighted and allowed to burn out, are perfectly sterilized; one is used for each operation (and can be re-sterilized). Three lineal scarifications are made on the skin, the lymph being rubbed in, in the ordinary way.

DISINFECTION.

UNITED STATES. **Treasury Department. Annual Report of the Surgeon General of the Public Health Service of the United States for the Fiscal Year 1923.** [CUMMING (H. S.). Surgeon-General.]—pp. vi–316. With 10 figs. 1923. Washington: Govt. Printing.

"*Investigations of the artificial and natural ventilation on steam ships and the use of cyanogen chloride as a new fumigant.*—The constituents used in the preparation of this gas are as follows:—

"4 ounces powdered sodium cyanide.

"3 ounces sodium chlorate.

"2 ounces talc.

"17 fluid ounces commercial hydrochloric acid, specific gravity 1·15 to 1·20.

"17 ounces water.

"Note.—This formula is tentative and may be changed later . . .

"During the first half of the fiscal year over 300 ships were fumigated with this gas, and it has been found to fulfil the following requirements:

"1. Toxicity: High toxicity for rodents, bats, roaches and bedbugs. (The amount required for lice requires further experimentation.)

"2. Detection properties: Intense lacrimation when lethal dose is used. In one-eighth lethal dose (having no harmful effect on rats after exposure of one hour) lacrimation was still extreme.

"3. No effect on foods, tobacco, fabrics, leather, and no corrosive action on metals (with the possible exception of nickel).

"4. Efficient penetration qualities.

"5. Nonpersistence: This gas is not more persistent than hydrocyanic acid gas; probably less so.

"6. Reasonably low cost per 1,000 cubic feet. Cyanogen chloride mixture, $0·088; hydrocyanic acid gas, $0·081.

"7. Fire and explosive hazards at minimum."

* * * * *

Quarantine recommendations.—"The cyanogen-chloride mixture is somewhat tarnishing to brass, nickel, and silver, although by no means to the same degree as is sulphur dioxide. While apparently

satisfactory for the destruction of rodents in the standards provided, it does not appear to have the same destructive action on roaches and other insects as does hydrocyanic-acid gas.

"From time to time note has been made as to spontaneous combustion with production of fire within the containers. This appears to occur in compartments having high temperature and in those containers in which the gas is more rapidly evolved, producing greater concentration. In spite of these defects, in this method it is believed that cyanogen chloride is preferable to hydrocyanic-acid gas as a fumigant, because of the automatic warning provided through its lachrimatory properties.

"The ventilation of holds of vessels after fumigation (and this especially applies to vessels with several 'between' decks) still remains the most serious problem of the fumigation procedure. With a moderate wind blowing, ventilation by means of improved windsails is reasonably satisfactory, and the use of areothrust ventilators is fairly effective; but the latter device is difficult to transport and the engine is of such a design that even with the most careful attention it is frequently out of order. Some effective means of ventilating holds of vessels is the most urgent need in ship fumigation."

SCHAEFER (H. F.). **Accidents mortels au cours de la dératisation de navires par l'acide cyanhydrique.**—*Rev. d'Hygiène.* 1924. July. Vol. 46. No. 7. pp. 694–696.

A graphic account of the invasion by hydrocyanic gas of the engine room of a ship, the holds of which had been disinfected at Havana in the usual way, and the collapse of a number of the crew in turn, till 20 were affected. Most were restored by artificial respiration, but five succumbed. It is noted that the Americans have the ship cleared of crew before fumigation with this gas. This occurrence shows that beside the well-known abrupt fatal intoxication with hydrocyanic gas there is a mild non-fatal form, and that the assertions of naval engineers that bulkheads are watertight are not always reliable.

CHILD WELFARE.

FEDERATED MALAY STATES. **Report on Infant Welfare and Maternity Work in Kuala Lumpur for the Year 1923.** [WERE (M. Josephine), Lady Medical Officer.]—6 pp. Supplement to the *F.M.S. Government Gazette.* August 8, 1924. Govt. Press.

"The centre is primarily an educational institution. It provides advice and teaching for young mothers of all nationalities in the care and management of their infants with a view to maintaining them in good health. The work of the Centre is directed rather to the supervision of the healthy infant and the education of the mother than to the treatment of the sick, but here the incidental treatment of simple ailments is included within its scope.

"Staff.—The staff of the Centre is as follows:—

"One lady Medical Officer; one Superintendent, European nursing sister; two health visitors."

Attendances.

	Infants.	Children.
1923	5,777 ...	2,872

MEDICAL INSPECTION OF SCHOOLS.

EKANAYAKA (H. E.). **Medical Inspection of Schools in Ceylon.**—*Jl. Ceylon Branch of the Brit. Med. Assoc.* 1924. Sept. Vol. 21. No. 2. pp. 84–85.

We here find particulars of the results of medical inspection of the more important "English" schools in Colombo, Kandy and Ceylon, and of a few typical vernacular schools for purposes of comparison. Defective vision, enlarged tonsils and adenoids, and dental caries, very common among the European children, are comparatively rare among the native children. Next to those diseases in frequency are said to come malnutrition, malaria, hookworm, and skin diseases (itch). In the vernacular schools "the standard of hygiene . . . is low," and "the conditions obtaining in the school itself are a constant violation of all sanitary requirements." [The fact that "a class lesson in hygiene is prescribed in the code from the fourth standard upwards" is something for those who insist on the abounding efficacy of "education" to ponder.]*

REPORTS AND VITAL STATISTICS.

ROCKEFELLER FOUNDATION. **International Health Board. Tenth Annual Report, January 1, 1923—December 31, 1923.** [RUSSELL (Frederick F.), General Director.]—pp. xvii+158. With 55 text figs. 1924. Jan. New York: Rockefeller Foundation, 61, Broadway.

The International Health Board's Annual Report is, as usual, an extremely fascinating document. It deals with the very wide activities of the Rockefeller Foundation, spread over the East, China, India, Ceylon, and many countries in Europe, and the United States of America. The accompanying plans and pictures speak for themselves. (Figs. 27–32.) A few extracts of a more scientific nature are given on the subject of hookworm and malaria.

Hookworm.—"Worm counts made in the district jail at Arecibo [Porto Rico] showed that agricultural labourers harboured an average of 572 worms, whereas town dwellers had only 210. For comparison, it may be stated that the agricultural labourer in Brazil has an average of 230 worms. In both countries it has been shown that occupation and habit as to shoe-wearing greatly influence the severity of the infestation, the farmer and those who habitually go barefooted showing always the highest rate."

The Spleen Index in Malaria.—"Relation between Degree of Splenic Enlargement and Malaria Infection.—In a series of 338 cases examined in Lee County a definite correlation was found to exist between the size of the spleen and the amount of malaria as measured by the plasmodia in the peripheral blood. Of 51 persons in whom the spleen was palpable on inspiration, 35·3 per cent. revealed plasmodia in the peripheral blood; of 126 with palpable spleen, 34·1 per cent. were positive for plasmodia; of 29 with spleen enlarged to one fingerbreadth below the costal margin, 55·1 per cent. were positive

* Summarized by Lt.-Col. A. ALCOCK.

for plasmodia; of 30 with spleen enlarged to two fingerbreadths below the costal margin, 60·0 per cent. were positive to plasmodia; and of 23 with spleen enlarged to three fingerbreadths below the costal margin, 69·5 per cent were positive for plasmodia.

"A comparison of the spleen rates, plasmodium rates, and malaria history index of 571 persons examined on 30 plantations in the county showed that the spleen index furnished a more sensitive measure of malaria than the blood index."

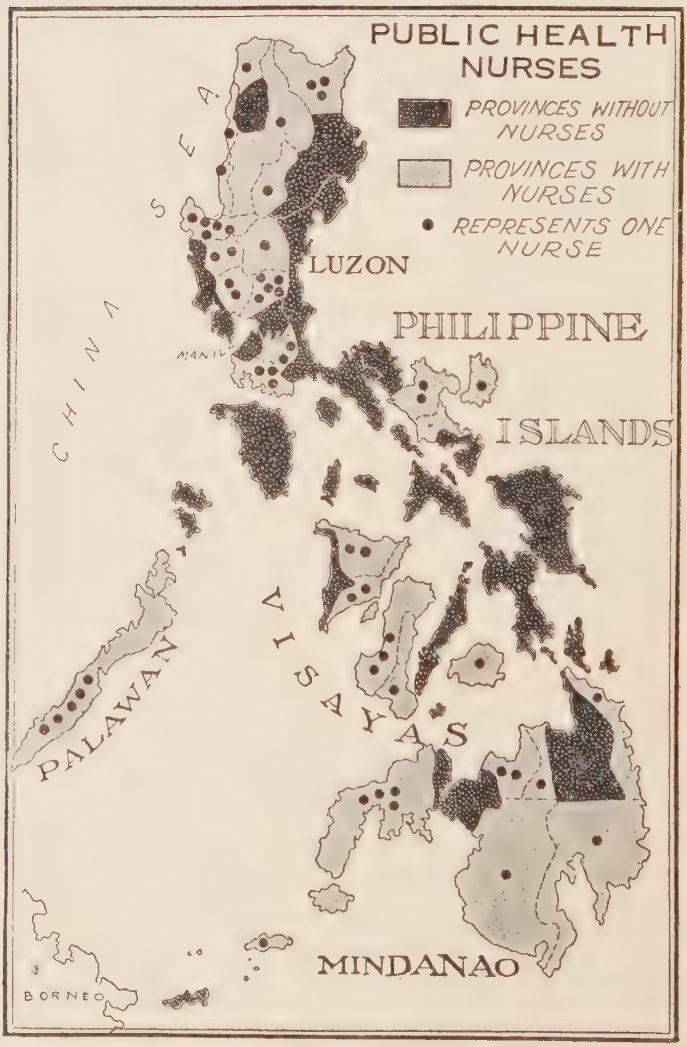


Fig. 27.—Map showing lack of trained personnel for spreading public health education in the Philippine Islands. The provincial or district nurse, of the type which the International Health Board is aiding the Philippine Health Service to train, spends most of her time in visiting the houses of the poorer classes, giving the necessary nursing care and teaching hygiene and sanitation.

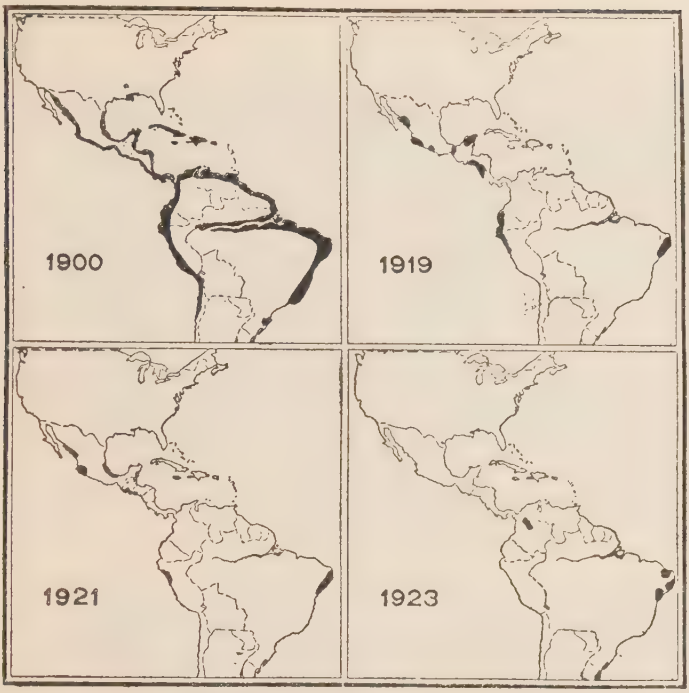


Fig. 28.—Yellow Fever in retreat. Map of western hemisphere showing steady reduction of infected areas.

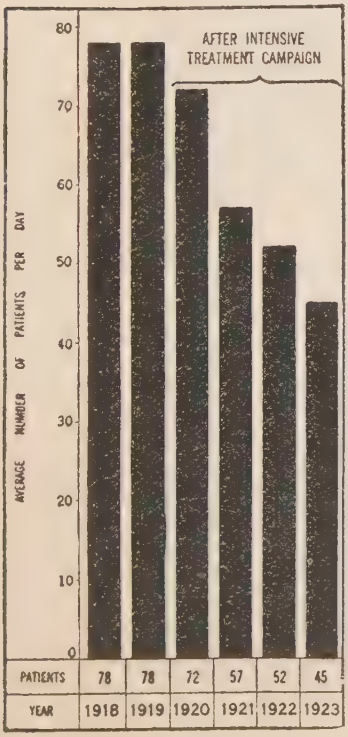
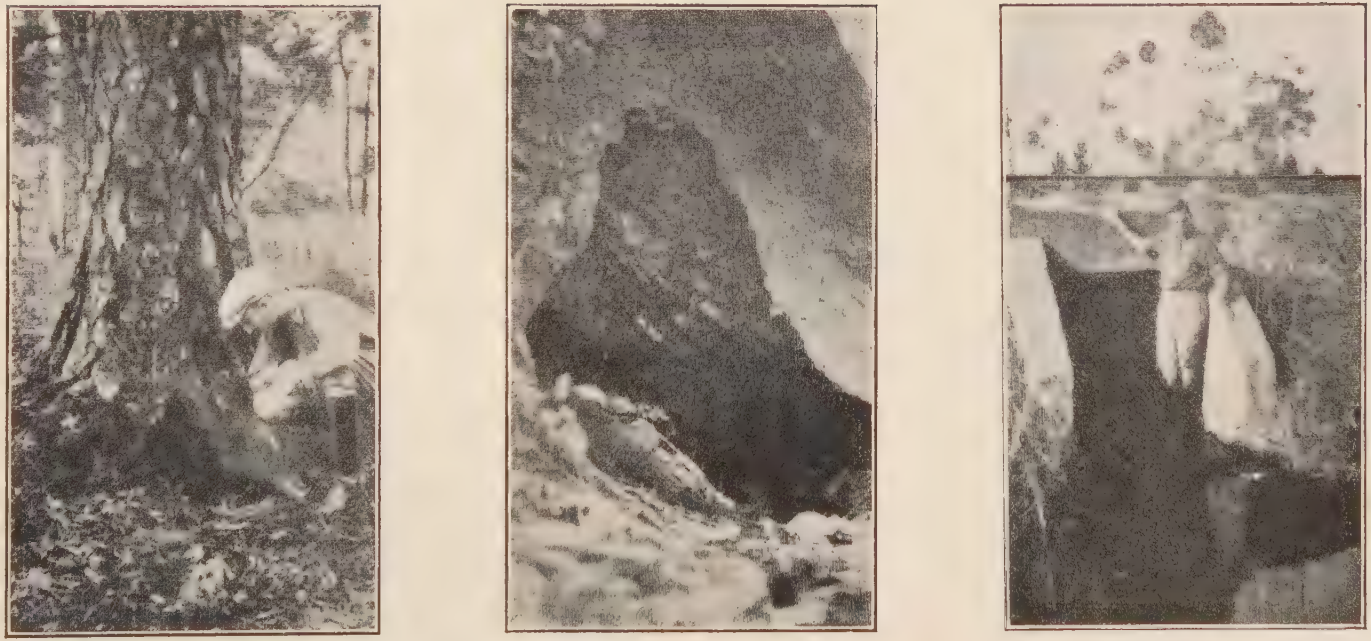


Fig. 29.—Reduction in the average daily number of patients treated in the Lionel Town Hospital, Jamaica. The figures show that the intensive hookworm campaign diminished the amount of sickness from all diseases, and especially from typhoid and dysentery.



(*a*) (*b*) (*c*)

Fig. 30.—(*a*) A tree hole shelter for *Anopheles quadrimaculatus*; (*b*) a close-up view of same hole, showing numerous mosquitoes resting; (*c*) railway culvert: a favourite resting place of *A. crucians*, which breeds in the water in the foreground.

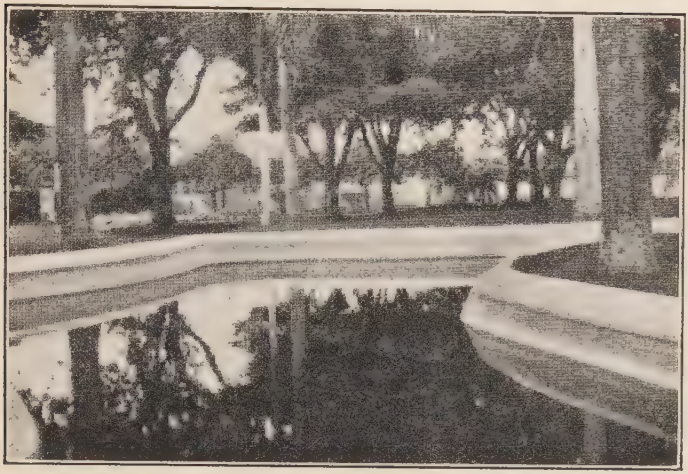


Fig. 31.—A " mojarrito " hatchery in Merida, Mexico.

Fig. 32.—Artificial pond in public garden in Bahia, Brazil. Fish are being bred in this pond for use in combating the yellow fever mosquito.

[Figures 27 to 32 are reproduced from the *Tenth Annual Report, International Health Board, Rockefeller Foundation, Jan.-Dec., 1923.*]

Panama Canal. **Report of the Health Department of the Panama Canal for the Calendar Year 1923.** [Fisher (H. C.), Chief Health Officer.]—95 pp. With 1 plate. 1924. Panama Canal Press, Mount Hope, C.Z.

The area with which this Report is concerned is the Canal Zone proper, with a population of 31,793, and the towns of Panama (59,000) and Colon (31,000).

In the Canal Zone the death rate was 7·14 and the birth rate 18·59. Ten per cent. of the deaths were caused by tuberculosis. The infant mortality was 72·76. In Panama City the death rate was 18·08, of which tuberculosis accounted for 18 per cent., an increase on the two previous years. The infant mortality was 141·95. The annual malarial rate per 1,000 (13·09) was higher than in the three previous years.

"Although the sanitated areas of the Zone are gradually being extended, principally by ditching of the larger outlying swamps and wet lands, there has been a slight increase in the malaria rates, especially among employees, yet the increase is not as large as might have been expected. On opening the Zone to re-population for agricultural purposes, chiefly by former employees of the Panama Canal, it was feared that, whatever benefits might be derived, there would surely result a tremendous infection with malaria, and that in spite of our precautions in locating these settlers at a distance of a mile or more from the Canal Zone towns, our employees would necessarily be infected from them. This has doubtless been the case in some instances, but the small added percentage of malaria so incurred has surely been more than offset by the improved economic condition of the population."

The "follow-up" treatment—10 grains of quinine preferably in liquid form every evening for 8 weeks after the subsidence of acute symptoms—is compulsory for employees, and relapse is rare.

The diagram (Fig. 33) shows the combined death rate from malaria in the Zone and the two cities.

Year.	Population.	Rate.
1906	73,264	9·49
1907	102,133	5·37
1908	120,097	3·36
1909	135,180	2·07
1910	151,591	1·89
1911	156,936	1·82
1912	146,510	1·64
1913	129,104	1·32
1914	123,592	1·27
1915	121,650	·51
1916	116,918	·21
1917	114,003	·18
1918	109,737	·18
1919	113,958	·16
1920	114,037	·08
1921	120,666	·16
1922	122,559	·15
1923	122,713	·15

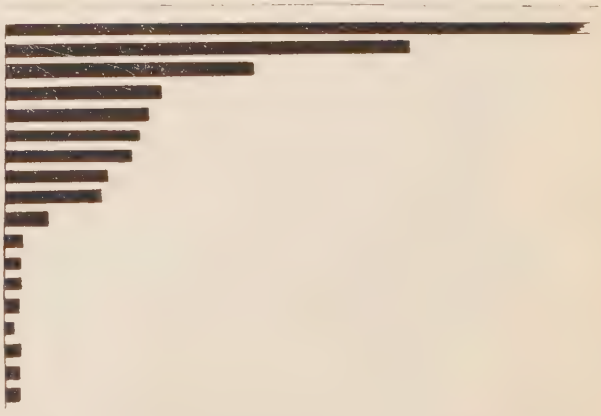


Fig. 33.—Diagram showing the combined death rate from malaria in the Canal Zone and the cities of Panama and Colon.

[Reproduced from the *Report of the Health Department of the Panama Canal for the Calendar Year 1923.*]

"An attempt is made to control all forms of mosquito breeding in the sanitated areas. Within a radius of approximately one mile from the residential sections, in addition to installing new drainage (subsoil or rock-covered tiling where practical), open ditches are kept to grade and free from vegetation, and oil is applied when indicated. Beyond the mile limit large areas of anopheles production are controlled by open ditching. These latter ditches receive sufficient attention to keep them efficient as drains, but no labour is expended upon the small amount of breeding that may occur in the ditches and isolated small puddles and cattle tracks."

Where conditions favoured only the production of *Anopheles eiseni*, oiling was abandoned and trees allowed to grow along the banks to produce dense shade; this species may be disregarded. The group known as *A. albimanus-tarsimaculata* may be considered the one important carrier, and the other seven or eight species of relatively less importance.

In his Report from the Health Office, Panama City, Dr. GOLDTHWAITE notes that, owing to the increase of diphtheria, throat cultures were taken from all school children. A total of 11,114 cultures gave virulent *B. diphtheriae* in 37 cases. He shows that the tuberculosis death rate has varied little in ten years, and expects no change till a sanatorium is constructed in a suitable place. In this year all dairy herds were given tuberculin tests; 40 reactors were found. In the native abattoir four animals were found with tuberculous lesions: it is commonly said that none of the native cattle are tuberculous.

Surgeon RUCKER, Chief Quarantine Officer, visited many Central and South American ports during the year.

"His reports indicate that yellow fever has almost ceased to be a quarantine problem. As a matter of fact, sanitary conditions in the Canal Zone are such that there is no practical danger of the spread of yellow fever even though it should be introduced. This belief is so strong that when yellow fever was discovered at Bucaramanga, in the interior of Colombia, the only restrictions placed on travellers from Atlantic coast ports of that country were that their temperatures should be taken daily by the ship's surgeons and a record thereof be furnished the quarantine boarding officer, and that the passengers report to the latter daily to complete six days from port of departure in order to have their temperatures taken."

Bubonic plague on the west coast of South America is a very genuine menace.

"In November, 1922, the quarantine division adopted tentatively the use of cyanogen chloride as a ship fumigant . . .

"Another formula was finally used which omitted the talc entirely and reduced the quantity of sodium chlorate thirty-three and a third per cent. The cyanide eggs are cracked into fairly good-sized lumps, and when prepared in this way the gas does not come off rapidly enough to constitute a fire hazard, although the process is not unduly slow. By hanging the generators just inside the hatches it was found that considerable time is saved and good diffusion of gas obtained. So satisfactory have been the results achieved by following this method that cyanogen chloride has been made the standard fumigant of the Panama Canal. It is a most rapid, satisfactory fumigant, and when demurrage losses are considered it is the cheapest method, costing less than half as much as sulphur dioxide and about 15 per cent. less than hydrocyanic acid."

Owing to the appearance of the article, "Plague Infected Rats without Visible Lesions," the animal inoculation method was used in the examination of a portion of the rats submitted to the laboratory, and 520 rats have been thus examined without discovery of plague. Over 14,000 were examined in the usual way.

14,648 Wassermanns were done on 9,680 persons. The table gives the results:—

	Positive.	Negative.	Total.	Per cent. positive.
White civilians and soldiers	592	4,469	5,061	11·69
Spanish and white natives	96	558	654	14·68
Blacks and mulattoes ...	925	2,980	3,905	23·68
Chinese	19	41	60	31·66
Grand totals	1,632	8,048	9,680	16·85

Of 205 cases which came to autopsy the chief causes of death in descending order were tuberculosis, syphilis (including general paresis), malnutrition in infants, organic heart disease, cancer.

British Honduras. **Medical Report for the Year 1923.** [Wilson (Basil M.), P.M.O.]—22 pp. 1924. Belize: Printed by V. Goodrich.

"*Enteric Fever.*—The Colony is remarkably free from this group of diseases. Only one case was treated in Belize Hospital, and none in the district hospitals. It is possible that unknown cases occur in the remote settlements.

"*Malaria.*—112 cases of all types were treated in Belize Hospital without any deaths; 134 cases were treated in district hospitals with 4 deaths. The Registrar-General's returns of deaths for the whole Colony show 32 deaths certified by registered medical practitioners from malaria; of these 10 are in the Belize district. On referring to the causes of deaths in cases not certified by registered medical practitioners there is naturally considerable doubt as to the diagnosis, but it is probable that about 150 cases were due to malaria. As to the actual prevalence of malaria I have no statistics, but I have no hesitation in saying that it is extremely common and is the cause of a great majority of absences from work and invalidity.

"*Dysentery.*—16 cases of amoebic dysentery and 3 cases of bacillary dysentery were treated in Belize Hospital, with one death; 39 cases of both types were treated in district hospitals, with one death.

"*Pulmonary Tuberculosis.*—31 cases with 16 deaths were treated in Belize Hospital; 22 cases with 5 deaths were treated in district hospitals."

Vital Statistics.—1923. Population, 46,527; total births, 1,764; total deaths, 954; birth rate, 37·9; death rate, 20·5; infantile mortality, 133.

Sanitation. Preventive Measures.—"The anti-mosquito work is by far the most satisfactory part of all the sanitary work which is done in the Colony. It is, however, not carried out on a sufficiently large scale. In Belize each inspector has one section of the town. Eight days in each month are alloted exclusively to mosquito work, and during that time every vat, well, barrel and other water receptacle, including flower vases in the houses, is examined and the presence or absence of larvae is recorded on special forms . . .

" Filariasis is, I believe, unknown in the Colony.

" Plague has never occurred. It is very improbable that it would be brought here by sea, as all steamers have to anchor at least a mile from the shore. There are no wharves for large vessels . . .

" Dysentery : It will be seen from the hospital returns that amoebic dysentery is not very common and bacillary dysentery is comparatively infrequent.

" House flies are not nearly so common here as in many tropical countries, in spite of the fact that the general standard of sanitation is not high."

TRINIDAD & TOBAGO. **Council Paper No. 58 of 1924. Health Conditions, 1923. Administration Report of the Medical Inspector of Health for the Year 1923.** [DICKSON (J. R.), Medical Inspector of Health.]—14 pp. 1924. Port of Spain : Govt. Printing Office, 2, Victoria Avenue. [Price 6d.]

Vital statistics :—

" Population estimated to mid-year	374,927
" Area of Trinidad (1,862 sq. miles), Tobago (114·40 sq. miles)	1,976·40 sq. miles
" Density of population	189 per sq. mile
" Total number of births registered	13,060
" Birth rate per 1,000 of the population ...	34·8
" Total number of deaths registered	7,862
" Death rate per 1,000 of the population ...	20·9
" Natural increase, i.e., excess of births over deaths	5,198
" Total number of still births registered ...	1,021
" Number of deaths of children under 1 year	1,695
" Infantile mortality rate (per 1,000 births)...	129·7
" Notifiable infectious diseases—total death rate per 1,000 of population	2·46
" Malaria death rate per 1,000 of population...	2·01
" Diarrhoea and enteritis do. do. ...	1·39
" Dysentery do. do. ...	·52
" Enteric fever do. do. ...	·38
" Bronchitis and broncho-pneumonia do. ...	1·57
" Pulmonary tuberculosis do. do. ...	1·25
" Pneumonia do. do. ...	·82
" Nephritis and Bright's disease do. ...	1·37
" Cardiac diseases do. do. ...	1·05
" Ankylostomiasis do. do. ...	·66
" Cancer do. do. ...	·39

KENYA. **Colony and Protectorate of : Annual Medical Report for the Year ending 31st December, 1922** [GILKS (John L.), P.M.O.], **including the Annual Report of the Bacteriological Laboratory for the Year 1922.** [KAUNTZE (W. H.), Senior Bacteriologist.]—201 pp. With 2 charts. Printed by Waterlow & Sons, Ltd., London.

There is much interesting matter in this Report, particularly under the head of Yaws and Plague.

Rats and rat fleas.—" Identification of fleas from 1,146 rats (*Rattus rattus kijabius*) caught in Nairobi between December 7th, 1921, and December 6th, 1922 :—

" Number of rats examined	1,146
" Number of rats without fleas	441
" Total number of fleas	3,105
" Average number of fleas per rat ...	2·7

* * * * *

" *Effects of the rat campaign in the incidence of plague.*—In last year's report it was stated that ' in the absence of detailed records of past outbreaks of plague in these districts, and particularly in the absence of information with regard to their seasonal incidence, it is not yet possible to draw any conclusions as to the results of the campaign, and it is unlikely that it will be possible to do so until it has been in operation for some years.' That statement still holds good, and though one might be tempted to correlate the small incidence of plague in 1922 as compared with the very considerable incidence in 1921 with the amount of rat-destruction which has been carried out, there is not, as yet, any justification for so doing. That such outbreaks as occurred were comparatively few in number and that none of them assumed any considerable proportions may, of course, have been due to the campaign. Of that, however, there is as yet no proof. The important point which emerges is *that, in spite of the campaign, certain small outbreaks of human plague did occur, i.e., it has been proved that, in spite of the amount of rat-destruction which took place, the infection still persists either in the domestic rodents or elsewhere.*"

* * * * *

Helminthiasis.—" . . . . From 60 to 80 per cent. of the persons constituting these populations were found to be infected with one or more kinds of helminth. The proportion infected with ancylostomes was greater on the coast than in the highlands or in the lake area, and except for those so infected few persons appeared to show obvious symptoms of disease, and even those who harboured ancylostomes were only in a few cases seriously ill."

* * * * *

Preparation for the treatment of Yaws.—" The success which the bismutho-tartarate of soda and potash has met with in the treatment of Yaws, combined with its low cost compared with the arsenobenzene compounds (I understand from the Principal Medical Officer that it will effect a saving in Kenya of something like £5,000 per annum), will probably bring to other colonial chemists the task of preparing this compound." The method of preparation was given in this *Bulletin*, Vol. 21, pp. 795–6.

South West Africa. [Union of South Africa : Mandated Territory.] **Report of the Administrator of South West Africa for the Year 1923.** [Hofmeyr (Gys. R.), Administrator.]—64 pp. 1924. Cape Town : Cape Times, Govt. Printers.

In the administration report of South West Africa is an interesting chapter on the health conditions. One of the main features is a very great prevalence of enteric both amongst Europeans and natives. This is largely due to polluted water during heavy rain and to deficient

sanitary arrangements brought about by the primitive habits of the natives. The following brief extracts are of interest :—

" *Scurvy.*—210 cases with 13 deaths were recorded during the year. Of these 138 cases with 10 deaths occurred on the Luderitz Diamond Fields, and 34 cases with one death at Tsumeb. Measures for the prevention of the disease are undertaken by all the mining companies, and consist mainly in the provision of a liberal allowance of fresh meat and fresh vegetables in the dietary. Trials were also made with germinated pulses, but have not met with success up to the present owing to the natives refusing to take food prepared in this manner. Kaffir beer is issued at regular intervals. On some of the mines goats are kept for the supply of fresh milk for those showing any signs of the disease . . .

" Scurvy may be regarded as practically non-existent among the natives employed by the Railway Administration. Since the 1st March, 1923, only 18 cases have been met with among a staff of 2,875."

* * * * *

" The number of cases of respiratory disease which came under notice during the year under review is as follows :—

	No. of cases.	No. of deaths.
Bronchitis	406 ...	2
Acute Lobar Pneumonia ...	213 ...	62
Influenzal Pneumonia ...	237 ...	30
Pulmonary Tuberculosis ...	102 ...	57
Other respiratory conditions	9 ...	—

" Of the above, 387 cases of bronchitis, 120 of acute lobar pneumonia with 23 deaths, 223 of influenzal pneumonia with 30 deaths, and 57 of pulmonary tuberculosis with 29 deaths occurred on the Luderitz Diamond Mines. The incidence of all respiratory diseases among the natives employed on these mines was 138·5, and the mortality 15 per thousand for the year. At Tsumeb the mortality from the same causes among the native labourers on the Copper Mine was 1·24 per 1,000 for the year."

* * * * *

" *Vital statistics.*—A law for the compulsory registration of births and deaths came into operation only on the 1st January, 1924. The information available for the year 1923 is incomplete and of little practical value. 389 births and 104 deaths were registered during the year.

ESPINASSE. **Le Service de santé en Mauritanie pendant l'année 1923.**—*Ann. de Méd. et de Pharm. Colon.* 1924. May–June–July–Aug. Vol. 22. No. 2. pp. 215–224.

Mauritania is a region of 347,000 square miles with a scattered population of 261,000. The medical personnel consists of a P.M.O. stationed at S. Louis and in charge of Senegalese troops there, three doctors in Mauritania itself, and 17 " infirmiers " ; it is obviously, as is stated, quite inadequate. Five districts are served by " infirmiers." The diseases treated in the year under review included :—

Syphilis	2,271	Smallpox	72
Malaria	1,442	Mumps	35
Gonorrhoea	125	Scurvy	20
Guineaworm	84	Trachoma	19
Beriberi	79	Tuberculosis	6

Europeans do well and are rarely invalided. Syphilis in many stations is the occasion of more than half the consultations; primary lesions are seldom seen; nervous symptoms are rare; the most common manifestations are those of the skin.

MAURITIUS. **Annual Report on the Medical and Health Department (1st January to 31st December 1923).** [GILCHRIST (T. B.), Director, Med. & Health Dept.]—41 pp. With 2 charts.

Estimated population	381,678
Birth rate	36·8 per cent.
Death rate	28·5 per cent.

"The number of deaths due to malaria and cachexia (highest death-producing factors in Mauritius) is 1,979, against 3,526 in 1922, or a percentage of 18·3 per cent. on total deaths, against 27·2 in 1922."

	1921.	1922.	1923.
Deaths from malaria in Port Louis ...	333	371	169

"The more notable causes of deaths were the following :—

	Number.	Percentage to total deaths.
Malarial and malarial cachexia ...	1,979	18·3
Pneumonia and broncho-pneumonia ...	1,393	12·9
Influenza	556	5·2
Diseases of early infancy	1,026	9·5
Pulmonary tuberculosis	828	7·7
Diarrhoea and enteritis	625	5·8
Bronchitis	521	4·8
Dysentery	318	3·0
Plague	118	1·1

"Deaths due to preventable diseases, *i.e.*, diseases due to faulty sanitary conditions, overcrowding, soil infection, defective or infective water supplies numbered 4,227."

Infantile mortality was 139·4 per mille, as against 147·9 and 179·7 in 1922 and 1921 respectively.

Plague.—"Rat-catching was persevered with throughout the year, and every rat caught, killed or found dead was examined bacteriologically.

"During the year all grain stores were regularly and often fumigated by means of the Clayton apparatus.

"Failure to eradicate plague and incomplete success of the anti-rat campaign are attributable to :—

"1. Old dilapidated buildings, out of repair, mostly old wooden buildings with double walls and connected with cellars and old drains.

"2. Overcrowding and insanitary mode of living of general mass of population.

"3. Lack of provision amongst the poor for keeping food out from access by rats.

"4. Grain stores, none of which is rat proof. Every Chinaman's house is a grain store. Rice, grain and gunny bags are stored all over the town.

"5. Ignorance of the population and reluctance to report cases of plague, specially in country districts, where straw huts are burnt when infected, although compensation is paid in each case."

* * * * *

"*Milk in Mauritius.*— . . . The whole question is being studied with the idea of improving the milk supply. There is no reason why milk should not be supplied clean and sweet in Mauritius. The questions of : (1) A Central Distribution Centre ; (2) the difference between milk delivered to the consumer in the raw state and milk treated with heat for the destruction of bacteria before delivery, are receiving attention."

CENTRAL PROVINCES & BERAR. **Annual Public Health Report for the Year 1923.** [STOKES (T. G. N.), Director of Public Health.]—pp. 3+87. With 1 chart. 1924. Nagpur : Supt., Govt. Printing, C.P. [Price 1 rupee.]

"Population.—The total population of the province according to the census of 1921 is 13,912,760 . . . .

"Births.—The births numbered 634,862, or 45·63 per 1,000 of the population, against 35·80 in the previous year, and the quinquennial figure 38·08 . . .

"Deaths.—The number of deaths registered during the year was 424,789, giving a ratio of 30·53 per mille, as against 407,827 with a ratio of 29·31 in the preceding year, and 51·85 the average for the previous five years."

Anti-malarial measures.—"A new material to prevent mosquito breeding in pools of water was tried, viz., 'Empranin No. 2,' a mosquito larvicide, supplied by Messrs. Martin and Co., Calcutta. This was tried at Nagpur with excellent results, and it was found to be more efficient than kerosene, the film being good and the cost cheaper than common oil. It has been brought to the notice of the chief municipalities in the province."

Medical Inspection of Schools.—"These inspections are producing good results, since very few unvaccinated children or cases of contagious diseases are now seen in schools. Sanitary defects in schools, such as overcrowding, want of proper ventilation, urinal or latrine arrangements, etc., are also detected by the medical officers, and are reported to the school authorities for adequate action. The number of children examined by the medical officers during the year was 46,196 boys and 5,260 girls ; of these 380 were found unvaccinated, 850 with enlarged spleen, and 617 with contagious diseases.

"In rural areas the epidemic dispensary staff inspected 967 schools and examined 49,759 children. Of these, 1,279 were found unvaccinated, 2,353 with enlarged spleen, and 1,526 with contagious and other diseases."

BANGALORE. **Health Department, Civil and Military Station. Administration Report for 1922–1923.** [AMRITARAJ (S.), Health Officer.]—pp. 44+ix.

Birth rate, 40·59 per mille, shows an increase of 2·6.

Death rate, 39·99 per mille. Average of the previous 5 years being 32·7.

Higher death rate is mostly due to plague.

Infant mortality, 266·5 per 1,000 children born.

There was a violent outbreak of plague during the year which was combated largely by extensive inoculation.

Fever mortality [total deaths]:—

Malarial fever	82
Influenza	51
Enteric group	17
Relapsing fever	13
Fevers of uncertain origin	294

SARAWAK. **Annual Report of the Sarawak Government Medical Department for the Year 1923.** [MARJORIBANKS (E. M.), P.M.O.]—25 pp. 1924. Kuching: Govt. Printing Office.

General Hospital.

"*Phthisis.*—There is little that can be done for the type of cases that come under our observation. They seldom present themselves for treatment until either alarming haemoptyses or advanced emaciation and weakness force them to seek alleviation. Again, the bulk of them have been opium smokers, and some still are. They are given a special dietary, and open air treatment is carried out on the usual lines. A few cases have shown marked improvement with sodium morrhuate and tuberculin injections. The disease is rampant in the city, the bazaars being chiefly responsible for its incidence and spread. Overcrowding is common in many houses, and the principles of ventilation and general sanitation are entirely disregarded. It is therefore not surprising that the disease is gaining ground.

"*Beri-beri.*—Admissions occur on an average of 2·5 per month. The results of treatment on dietetic lines have been most favourable. As often as possible samples of rice are called for from the patients' houses or from the estate or factory in which they are employed. The specimens were practically always highly over-milled. A consistent standardisation of the supply purveyed by the rice merchants would be of valuable assistance.

"*Malaria.*—The number of cases of malaria was comparatively small. The majority came from Satang Island; a few developed cerebral symptoms. Treatment was administered by the intramuscular and intravenous methods. Two fatalities occurred soon after admission; they were in an extreme toxic condition. The remarkable diminution in the size of the enlarged spleens after injections of Novarsenobillon was worthy of note."

* * * * *

Pathological Department. [LE SUEUR (Elizabeth), Pathologist.]—

	Faeces Examinations.	Hook-worm.	Round-worm.	*Entamoeba Histolytica.*
		per cent.	per cent.	cases.
Routine laboratory work...	2,160	46	52	45
Sarawak Rangers and families	271	40	70	—
Sarawak Police	144	24½	47	—
Convent girls and hospital	98	38	88	—
Sadong miners:	508	—	—	—
Surface workers ...	—	100	70⅓	—
Underground workers ...	—	97	26½	—
Brooketon Mines	50	100	80	—

* * * * *

"One may make preliminary remarks on the presence of filarial infection in this country. The matter has never been scientifically worked out. In the laboratory we have examined 1,416 slides of night and day blood of Chinese, Malays, Dyaks and Tamils.

"Results show an infection of Chinese and Tamils only in night blood—about 3 per cent.

"In Malays and Dyaks a non-periodic micro-filaria is present, 12 per cent. day and 10 per cent. night blood.

"The Dyaks of Simanggang seem to be the most heavily infected people.

"Further work on this subject would be of great interest to the medical world, but one can draw no conclusion until one has examined a large number of slides and worked out the infecting mosquito in all types of filaria.

"I was at Sadong from January 16th to February 10th, and investigated the incidence of Hookworm and other intestinal parasites there. I found the mine population heavily infected with both hook and round worms. I visited Sadong in May and arranged for treatment and for prophylactic control against reinfection. The mine population are localised in the district around the mine and are directly under control of the manager—(making treatment and control of the disease practical). Mass treatment with carbon tetrachloride and oil of chenopodium was given, patients being admitted for 12 hours to the mine hospital. The drug proved quite efficient and safe. Mr. Evans reports later in the year that the results of treatment have been apparent in the immediate and sustained reduction in the hospital attendance by about 60 per cent., and in the better working capacity of the men. The success of the treatment is largely due to his interest in the scheme and his energy in supervising the provision of sanitary accommodation and prophylaxis."

Straub (M.). **Over zuigelingensterfte op de ondernemingen in Deli, S.O.K.** [Infant Mortality on the Estates in Deli, E.C. Sumatra.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1924. Vol. 64. No. 6. pp. 978–988. With 3 text figs. [3 refs.]

This article concerns the children of Javanese coolies on rubber and tobacco estates. The infant mortality under one year of age was found to vary from 16 to 31 per cent. The highest mortality occurs in the first four months of life ($3\frac{1}{2}$ times the mortality of the same age class at Amsterdam in 1913). Diseases of the respiratory tract constitute the principal cause of death (25 out of 39 deaths, 14 out of 30 deaths); ignorance of the mothers, resulting in ill-treatment of the babies, appears to play an important part in this respect. Nearly all the mothers suckle the children, but additional rice feeding is common after a few weeks. Yet the majority of the children thrive and intestinal affections are of little importance. Syphilis is of no practical importance as a cause of death; hereditary syphilis is rare. Malaria may be the cause of high mortality wherever it occurs in epidemic form.

Here and there attempts are being made to improve the situation. The mothers should be encouraged to bring sick children to the hospital; regular and frequent control and weighing of the children

on the estates is necessary; crèche rooms, where the children are attended to during the working hours of the mothers, may do away with the habit of carrying the babies about during the work.*

MITCHELL (J. A.) **The Avoidable Wastage of Child Life in South Africa.**—*Med. Jl. S. Africa.* 1924. Sept. Vol. 20. No. 2. pp. 34–37. With 1 chart.

An address delivered at the Child Welfare Conference, Capetown, March, 1924. The author gives an interesting chart of the infantile mortality of European infants from the year 1910 to 1922. (Fig. 34.) It shows a steady fall for all the Provinces of South Africa in the last 12 years and lower figures throughout for Natal. The present rate for the whole Union is about 80; the author believes it could be reduced in a few years to below 60. He would have a National Council to co-ordinate and direct maternal and child welfare activities, the constitution of which should be chiefly voluntary, to be subsidized from Government funds.

FIJI. **Legislative Council. Council Paper No. 17. Medical Department. (Annual Medical Report for the Year ending 31st December, 1923.)** [MONTAGUE (A.), Chief Medical Officer.]—38 pp. 1924. Suva: By Authority: S. Bach, Govt. Printer.

Infectious Diseases.

Dysentery.—The year 1923 was a satisfactory one as regards dysentery. In the Colonial Hospital and in Levuka Hospital there were fewer cases than in any previous year . . .

" *Enteric.*—Small epidemics of enteric fever occurred during the year . . . These small epidemics are generally due to the infection of water supply and the sporadic cases to fly-borne infection . . ."

" *Ankylostomiasis.*—The campaign against this disease was continued throughout the year under the guidance of Dr. Lambert of the Rockefeller Foundation. The drug used was carbon tetrachloride given with magnesium sulphate, and, where ascarides were prevalent, with oil of Chenopodium also. In all, 41,900 patients were treated, making a total with those treated in 1922 of 91,900 out of a total population of nearly 164,000 . . .

" *Influenza.*— . . . 1,008 cases were treated in the hospitals with 2 deaths . . ."

" *Other infectious diseases.*—Mumps and chicken pox were the other infectious diseases prevalent during the year. Chicken pox is always present in the Colony. Small localised epidemics occur, but there has never been a general epidemic. Mumps is introduced from outside the Colony from time to time."

Vital Statistics.

Birth rate, 1922, for all races was 31·86 per thousand.
Death rate ,, ,, ,, 15·93 ,, ,,

* Summarized by Dr. W. J. BAIS.

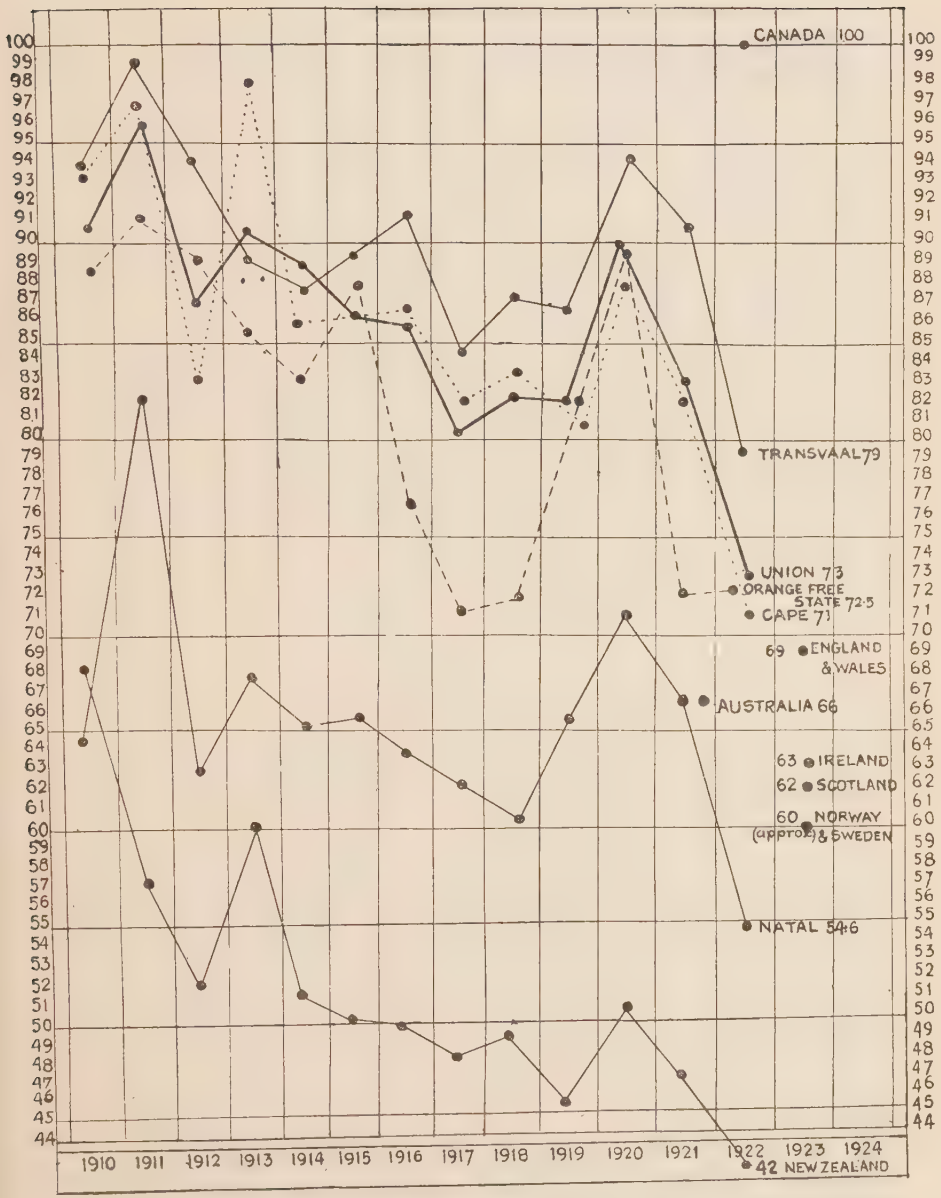


Fig. 34.—European infantile mortality in South Africe, *i.e.*, deaths of European infants under one year per 1,000 births.

[After figure in Dr. J. A. Mitchell's paper in the *Medical Journal of South Africa.*]

GIBRALTAR. **Colonial Hospital. Annual Medical Report for the Year 1923.** [LOCHHEAD (Jas.), Surgeon, Colonial Hospital.]—4 pp. 1924. Gibraltar: Printed and published by William Miles, for the Garrison Library, Govt. Printers.

"During 1923 the outstanding feature has been the occurrence of an epidemic of scarlet fever in Gibraltar. It is the first recorded epidemic, and not even the oldest inhabitants can recall a similar outbreak. In previous reports I have referred to the absence of this disease amongst the Gibraltarians, even in years when the children of British soldiers here stationed were affected by it. An occasional doubtful case has from time to time been kept under observation in the hospital, but from 1912 till 1922, when two typical cases occurred, I had not seen a single undoubted case among the local population. The outbreak began in February, and it continued throughout the year, 218 cases in all being reported, of which 5 proved fatal. The first case to be admitted to hospital was received on April 11th, and, in all 29 cases were treated, with three deaths. Of the total, 13 were treated for the military authorities. The percentage of admissions was small, but no patient desiring to come into the hospital was refused. At the same time no pressure could be brought to bear on parents to send in affected children, because the accommodation is too limited for such an extensive outbreak. Should another epidemic of scarlet fever occur, and isolation in hospital be considered advisable, accommodation elsewhere must be found."

MISCELLANEOUS.

VAN OYE (Paul). **Les marais de la Province de l'Equateur au point de vue Hygiénique.**—*Bull. Agric. du Congo Belge.* 1923. Dec. Vol. 14. No. 4. pp. 535–544.

In the Equatorial Province of Belgian Congo there exist vast swampy forests periodically flooded in the rainy season, and having much the appearance (though, of course, the actual flora is quite different) of mangrove swamp. Their surface soil consists of a soft sticky mud, known as *poto-poto*, not much more than knee deep, lying upon a very firm and hard sandy subsoil. Leaves rot very slowly in the *poto-poto*, and its microflora and microfauna are particularly rich in bacteria, diatoms, confervoids, rhizopods, and flagellates; whereas in the firm subsoil micro-organisms of any kind are extremely scarce. In the rainy season the pools in the *poto-poto* are full of mosquito larvae. What the author would like to do is to clear the jungle, concentrate the water in fish-ponds by proper drainage, and bring the drained land, with its potential richness, under suitable cultivation. The fishponds, of course, would be stocked with good edible fish kept under proper piscicultural regulations.

The author believes stoutly that even such places as these equatorial marshes can be made safe for the white man. [And, really, when one considers what man has accomplished since he started on his long journey with nothing but a chipped flint, and perhaps a dog of some sort, who shall decry the author's faith ?]*

* Summarized by Lt.-Col. A. ALCOCK.

WEBSTER (J. S.). **Hospital Construction.**—*Far Eastern Assoc. Trop. Med. Trans. Fifth Biennial Congress Singapore.* 1923. pp. 845–863.

The writer gives a detailed account of the design of a thoroughly satisfactory hospital for tropical countries. All interested should obtain the paper.

As regards site selected we need not make any remarks. The area per patient is suggested as follows :—

1st and 2nd class wards.—	Single rooms,	200 sq. ft. and	2,800 c. ft.
	General ward,	120 ,,	1,680 ,,
	Double room,	165 ,,	2,310 ,,
3rd class wards.—	Single room,	160 ,,	2,240 ,,
	General ward,	10 [? 100]	1,120 ,,

As regards the building the writer suggests that numerous blocks are more satisfactory than one large building, and advocates particularly the system, undoubtedly necessary for tropical countries, of a second and sometimes a third class division.

In the administrative block " the male reception rooms and the offices can be sited in one pavilion on the ground floor ; the rest of this pavilion may house :—

" 1. A students' common room.

" 2. A room for the casualty clerks on night duty, and which should therefore be next to the recovery ward.

" 3. A room for the staff containing a small reference library.

" The female reception room should be sited in the other pavilion of this block, which may also be used to house :—

" 1. The dispensary and drug store ; this unit must not be cramped for space, and must be well equipped.

" 2. A pack store in which the heavy baggage of the patients may be stored. This is essential in any seaport town, as it often happens that cases are landed from the ships and arrive at the hospital complete with baggage ; this baggage is both bulky and heavy, so for convenience in handling the store must be on the ground floor.

" 3. Store rooms.—The whole block is surrounded by a verandah 10 feet wide, which serves to connect the various rooms, and is expanded at the end to serve either as a waiting room for the office, or, where it is adjacent to the stores, as a platform for the dealing with the goods."

The store rooms should be at least 30 by 16 ft., and should be provided with stands and centre shelves. The laboratory should be 23 by 10 ft., and well lighted. The first class wards should be surrounded by a verandah some 10 ft. in width. A single room should be 16 ft. by 12-ft. 6 in., with a height of 14 ft. ; each room should have one door opening on to the verandah and one on to the passage. The general ward is 64 ft. by 30 ft. by 14 ft., so that each patient has 120 sq. ft. of floor space and 1,680 c. ft. of air space.

The ward offices are as follows :—

" 1. A sister's duty room fitted with two recesses, one for a wash hand basin, and the other as a medicine cupboard complete with door and lock.

" 2. A linen store fitted with shelves.

" 3. A surgical store where bed tables, splints, etc., may be kept. The upper part of this store is also fitted with a series of lockers, numbered to correspond with the beds and fitted with locks ; here the clothes in which the patient actually arrives may be kept after any requisite disinfection has been done.

" 4. A small medical store fitted for the examination of specimens.

" 5. A kitchen fitted to deal with the food arriving in the food wagons and also for the preparation of any simple diet ; the floor and walls must be tiled. Next to it should be :—

" 6. The pantry with sink, draining boards and plate racks.

" 7. A dining room for convalescents ; it should be opposite to the kitchen and on the other side of the passage ; in this position easy, good and rapid attendance, with the minimum of labour to the staff, can be provided ; the interposed passage cuts off any smell involved in the preparation of the food."

All corners and angles in this building should be rounded, all lighting preferably electric, electric fans should be provided when possible. The laboratory block, operation block, eye department and X-ray departments are described.

The third class accommodation is described as follows :—

" 1. In the admission blocks a section wherein the patients may be bathed must be provided. It will consist of three rooms, *i.e.*, a room where the case undresses, a bathroom, and a room where he dons the hospital clothes. A dirty clothes store or bin is needed, and a packstore in which his clothes are kept after disinfection and prior to his discharge.

" 2. An admission ward in which all the cases remain until diagnosed is essential.

" 3. The wards may be slightly smaller and accommodate twenty patients. No louvred casements for use during the storms are provided, as the doors will suffice, and free ventilation is obtained.

" 4. One ward designed for the dysentery cases to be fly-proofed.

" 5. One ward designed for the malaria cases to be mosquito-proofed.

" 6. The theatres to be simpler, as there will be no special departments, and the more serious operations will be performed in the large operating suite.

" 7. The floors to be of cement.

" 8. The latrines will be similar to those already described, but will have squatting seats.

" 9. Separate kitchens will be provided for Malays, Chinese, Sikhs and Bengalis.

" 10. No stores, as those already described will suffice."

The isolation block, nurses home, dressers' quarters, etc., are also described.

ORTT (M. W. A.). **La surveillance des enfants des Indes néerlandaises qui séjournent dans les Pays-Bas.**—*Bull. Internat. de la Protection de l'Enfance.* 1924. Aug. 31–Sept. 30. No. 29. pp. 832–837.

The writer deals with a most excellent organization which exists in the Low Countries for the care of children whose parents are serving abroad in the Dutch East or West Indies. Many of these children left to private families are not properly looked after, their education is neglected, and sometimes even their living arrangements are unsatisfactory. The " Tokuni " is a society or bureau which takes the place of the parents.

Cunningham (J.) & Raghavachari (T. N. S.). **Recent Methods of Differentiating Lactose Fermenting Organisms, as Applied to Indian Conditions.**— *Indian Jl. Med. Res.* 1924. July. Vol. 12. No. 1. pp. 75–81. [20 refs.]

The authors have investigated the lactose fermenting bacteria obtained from water and faeces.

"The results of various investigators show that lactose fermenting bacilli can be divided into two main groups by the methyl red and Voges Proskauer tests, that the M.R.—, V.P.+type are rare in the faeces of man and animals, are more common in surface water and sewage, and are the predominant type in grain and soil. These findings are in favour of the view that they are either the natural survivors of the lactose fermenters present in excretal matter, or are derived from soil or possibly grain, and consequently their presence in water and food products is to be regarded as of less sanitary significance than the presence of excretal *B. coli*."

"Summary and Conclusions.—We have examined the lactose fermenting organisms in a large number of samples of human faeces derived from both vegetarian and non-vegetarian communities, bovine faeces, and water from various sources of supply, with reference to the proportion of high and low ratio groups to be found in each, and have obtained the following results :—

"1. The percentage of the high ratio group (M.R.—, V.P.+) in the faeces of the Madrasi community as a whole is 2·1, the figures obtained from non-vegetarian and vegetarian sources respectively being 0·4 and 4·6.

"2. The high ratio group forms 0·5 per cent. of the lactose fermenting organisms in bovine faeces.

"3. In unfiltered water 29·8 per cent. of the lactose fermenting organisms belong to the high ratio group. There is no substantial difference to be found in the distribution of the two groups, if the samples are divided according to their source. (Rivers, impounded surface water and springs and wells.)

"4. Our results agree, therefore, with those obtained by other observers in different parts of the world.

"5. We have not, up to the present, been able to obtain any clue as to the probable source of the organisms found in water from this grouping alone."

We have always held the opinion that classifying faecal bacteria on a basis of fermentation tests in the laboratory is not likely to be of much service in interpreting the observed results of analysis of polluted water.

Miyairi (Keinosuke). **A Method of Investigation of the Nation's Health.**— *Japan Med. World.* 1924. Aug. 15. Vol. 4. No. 8. pp. 198–202. With 3 charts.

The author gives an account of an investigation in certain counties of Japan. He points out, to commence with :—

"1. The ever-increasing death of infants.

"2. The number of deaths of children is so many as compared with any other nations, and in any ages.

"3. The number of deaths from tuberculosis is gradually increasing. Particularly, no example is observed in any other civilized nations as Japan, where death of young women is notable."

He describes the method used in the investigation. Some of his results are as follows :—

" If the results based on our investigations are referred to, about 90 per cent. of the examined persons had *Ascaris lumbricoides*, over 90 per cent. of them *Trichocephalus trichiuris*, about 20 per cent. of them *Ancylostoma duodenale*, over 6 per cent. *Trichostrongylus orientalis*, and about 22 per cent. *Schistosomum japonicum* . . .

" 80·3 per cent. of the boys and 37 per cent. of the girls harbour the eggs of Schistosoma in the feces."

He believes the main cause of the excessive infantile mortality to be Ascaris, and quotes a doctor who reached the same conclusion more than a hundred years ago. He considers that the frequency of hookworm, strongyloides and schistosoma is largely responsible for the stunted growth of the Japanese. By way of remedy he considers that all nightsoil should be collected and allowed to ferment in a pit, before it is used for manure. By this simple procedure the eggs and larvae of the worms would be killed, and the manurial value of the nitrogen would not be lost.

CORREIA (Alberto Carlos Germano da Silva). **O clima, a nosografia e o saneamento de Loanda.**—*Revista Méd. de Angola.* (No. especial 1ª Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2ª Sessão). 1923. Aug. No. 4. pp. 377–482. With 11 charts. [28 refs.]

This lengthy contribution is divided into three parts. The first is climatic and gives a statistical account of the temperature, humidity, rainfall, direction of the prevailing winds, atmospheric pressure and death returns in Loanda from the middle of the last century.

The second traces for the past 40 years the vagaries of the chief diseases, such as malaria, tuberculosis, cerebrospinal fever, dysentery, beriberi, enteric fever, yellow fever, plague, etc. From the malarial aspect, says the author, Loanda has improved since 1905. This is not borne out by the figures in the table given, for in the years 1918-1922, inclusive, the figures are, with one exception, higher than in any year since 1885. Tuberculosis has also increased its ravages ; a table is given showing that the number of deaths recorded in 1885 was 59, whereas in 1921 it was 434, there being as many as 62 in the month of April alone.

A sub-division of this section deals with the more important epidemic diseases, such as yellow fever, plague and smallpox. An interesting discussion based on previous reports and records is given as to the time of introduction of the first-named into Africa, but the question is left unsolved. In the part dealing with plague there is a brief sketch of the epidemic which started towards the end of September, 1922, and attacked 90 persons in three months, amongst them 6 Europeans ; two of the latter died and 48 per cent. of the native cases. Smallpox is shown to have been attended with a high case-mortality. In 1873, out of 427 cases, 93 terminated fatally ; in 1881 there were 114 deaths among 192 cases. It is shown in a table that during the 9 months October,1901–June,1902, 475 deaths occurred from variola ; the number of persons attacked, however, is not stated.

The third and last part of this paper treats of sanitation in Loanda and offers suggestions on the usual lines for disposal of excreta, provision of sanitary conveniences in the cities, purification of water, and the

necessity for dealing with beggars, who by their rags and vermin may introduce and spread disease.

The dwellings in Loanda are said not to be very suitable for a warm climate; they are generally small, ill-ventilated and badly lighted; warehouses and food-stores are not rat-proof, slaughter-houses are not constructed on modern lines and are, moreover, situated in the crowded parts of the town. The paper ends with suggestions for remedying these defects and for establishing disinfection and vaccination stations and a general health service.*

DOS SANTOS (F. Ferreira). **Assistência médica aos indígenas e processos práticos da sua hospitalisação.**—*Revista Méd. de Angola.* No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2ª Sessão.) 1923. Aug. No. 4. pp. 51–71. With 7 figs.

This paper contains statistical returns and some excellent suggestions for providing proper treatment for the native, including preventive measures against disease. The importance of reliable statistics for gauging progress is rightly stressed, and also that of the study of the anthropology and ethnology of the races with whom the medical practitioner comes into contact. For dealing with smallpox vaccination-posts should be established, and care should be taken that revaccination is performed in due course; control of the sale of alcoholic drinks and prohibition of the manufacture of native fermented liquors are insisted upon. Prevention of the spread of leprosy, tuberculosis and syphilis by examination, treatment and segregation in suitable cases are mentioned. For investigation and advance of scientific work specialists should be appointed to a central laboratory. Two pages are occupied by clear plans of institutions denominated Sanitary Posts, Class I and Class II. The first is arranged for dealing with a certain number of bed cases and for infectious patients, with the necessary administrative and sanitary adjuncts; the second is on similar lines, but smaller, and is not suited for serious bed cases. The nursing staff of the former consists of one European and two natives, while for the latter one male native attendant is considered sufficient. In addition to the above there should be a district hospital (Enfermaria regional) with a medical man in charge, assisted by a second qualified doctor if necessary, and also a European dispenser, in addition to the nursing staff.*

DA COSTA (Alfredo Gomes). **A higiene e a assistência clinica aos trabalhadores das Fazendas Agrícolas da Região do Amboim.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2ª Sessão.) 1923. Aug. No. 4. pp. 367–375.

The number of patients receiving treatment from the "Health Delegation" of Amboim increased from 160 in 1921 to 421 in 1922, and during the first four months of the following year the figure had already reached 449. For the better care of the estate workers the author makes suggestions of which the following are the most important:—

(1) That the men, before being engaged, should be medically examined; (2) improvement of housing conditions and food; (3) that each estate should have an infirmary capable of accommodating

* Summarized by Dr. H. Harold SCOTT.

8–10 per cent. of the number of employees, under the care of a certificated attendant ; (4) that estates employing large numbers of workers should combine to obtain the services of a duly qualified medical man.*

Carneiro e Menezes (Manuel de Vasconcelos). **Assistência a alienados, anormais, inválidos e convalescentes.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2ª Sessão.) 1923. Aug. No. 4. pp. 361–366.

The author points out the needs of Angola in respect of mental asylums, and suggests that two selected medical men should be sent to one of the asylums of France or Italy to study pathological psychology for a period of two years. On their return they should be stationed at some centre, and there train others to take up work as specialists at small observation stations established in important parts of the colony, such as Loanda, Benguela and Mossamedes. His main contention is that the work should be taken up again *de novo* and not merely adapted to the old lines and existing institutions.*

Sant'Anna (J. Firmino). **O problema da assistência médico-sanitária ao indígena em Africa.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental, Vol. 2. 2ª Sessão). 1923. Aug. No. 4. pp. 73–178.

This contribution may be regarded as a small manual of public health based on Utopian principles. It is divided into six chapters. The first is a general statement of the varieties of morbid and insanitary conditions met with, and a draft of the measures proposed for combating them. The second is concerned with the rural population and their sanitary desiderata, such as pure water, the treatment of soil-pollution, dwellings, food, protection from noxious animals. The third deals with such hygienic problems as maternity and child-welfare, and the prevention of specific diseases. The fourth is devoted to the help which should be given to natives in the interior by means of travelling institutions and visiting doctors, small station hospitals, and special expeditions for dealing with particular problems such as ankylostomiasis, sleeping sickness, etc. In Chapter V. the question of the needs of populous centres is taken up, together with special matters such as alcoholism, the spread of tuberculosis and venereal disease, and the establishment of hospitals, dispensaries and clinics, and the training of native nurses. The final chapter contains remarks upon immigration, the introduction of infective diseases, recruiting and travel, and the provision of rest-houses. Even the prospect of establishing medical schools for the native is not forgotten.*

Correia (Alberto C. Germano da Silva). **Os climas planálticos de Angola aproveitáveis para a instalação de estâncias sanitárias de altitude.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2ª Sessão). 1923. Aug. No. 4. pp. 209–307. [42 refs.]

A hundred pages, almost entirely statistical, with short remarks upon the various health resorts in different parts of the world, in India, Ceylon, Central America, etc., and, in a little more detail, some of those in Angola.

* Summarized by Dr. H. Harold Scott.

The meteorological conditions and sanitary features of each are given, in several instances in tabular form, stating the maximum, minimum and mean temperatures, the rainfall, the number of cloudy days, and so forth, from 1913 onwards. Probably a reliable guide on such matters for intending visitors.*

REVIEWS.

LEAGUE OF NATIONS. **The Prevalence of Epidemic Disease and Port Health Organisation and Procedure in the Far East. Report presented to the Health Committee of the League of Nations** by F. Norman WHITE. (C.H. 130.)—179 pp. With 1 folding map. 1923. Geneva.

This is a noteworthy contribution to the literature, especially to that concerned with plague. The author writes with conviction; he deplores the assertiveness necessitated by condensation, and fears it is open to criticism. Controversy will probably arise, but a decisive attitude born of sound practical experience is sometimes acceptable.

The greater portion of the report deals with the numerous countries visited and provides a valuable record of local conditions and organization for preventive measures. Where defects were found they have not been overlooked, but mention has been made of them in such a manner that no objection should be raised.

The beginning of the report consists of observations on certain diseases, and views have been expressed that may call forth controversy. These views should, however, receive careful consideration.

Plague is first dealt with. The author contrasts the bubonic and the pneumonic types; he regards the diseases, though both due to the same micro-organism, as distinct as any two diseases can well be from the epidemiological point of view. He believes that the pneumonic variety is caused by the plague bacillus in symbiosis with another organism, and is a disease *sui generis*. It is admitted that this aspect is theoretical, and that the confirmation or refutation must rest on further laboratory investigation. He states that, if the existence of this hypothetical symbiotic organism be postulated, all, or nearly all, regarding the history and epidemiology of plague that is obscure in the light of present knowledge becomes clear.

He urges that, save under exceptional circumstances, bubonic plague does not give rise to direct transference of disease from the sick to the healthy. He admits that bubonic plague cases with lung involvement should be isolated and nursed with adequate precautions, but notes that these are frequently neglected with impunity in crowded Oriental towns. The significance of these facts is weighty. He considers the assumption that bubonic cases play an important part in the propagation of the disease is unwarranted, and has influenced sanitary conventions and port health procedure in many countries.

He proceeds to the importance of grain and of the grain trade in the spread of plague and gives three very simple rules for the rat-proofing of grain stores.

The importance of the species of rat found in relation to the prevalence of disease in man is emphasized, and attention is called from the same point of view to the significance of the species of flea infesting the rat. Following this the need for systematic rat examination in ports is advocated, as such should be of great value in locating foci of infection persisting during the non-epidemic season. The distribution of plague in Asia at the time of his tour is given, and remarks are added on measures required

* Summarized by Dr. H. Harold SCOTT.

at the port of departure, with present delinquencies. Municipal anti-plague methods are mentioned, and the possibilities connected with a "Rat Lottery" brought to notice.

A summary of conclusions contained in 31 headings brings the remarks on plague to a close.

The observations on Cholera and Smallpox contain information as to the value of anti-cholera inoculation and search for cholera carriers.

The next subject dealt with is "A Sanitary Convention for the Countries of the Far East." The existing convention is looked upon with disapproval by many Health Administrations in the Far East, primarily because it was designed to protect the West from the East. The East needs protection from itself. Centres of infection are so close at hand that the danger of transmission of disease is much more acute. It is not proposed to modify in any way the existing International Sanitary Convention of Paris, but to incorporate in it as a separate chapter a Far Eastern Convention, applicable only to those countries in the East who may elect to adhere thereto.

A draft of the suggested convention is given, and this should be consulted in the original. It deals with a large number of matters of great importance, and the proposed terms have been discussed by several Health Authorities concerned and have met with general approval.

The last article in this report deals with a "Central International Epidemiological Intelligence Bureau for the Far East," which might well take advantage of the existing organisation of the Far Eastern Association of Tropical Medicine. The proposal has been gone into in considerable detail, which must be left to the reader to assimilate.

The two last-mentioned proposals are of much importance and of a far-reaching character. If adopted, they should assist greatly in controlling the spread of communicable disease in the Far East.

G. E. F. Stammers.

Wu Lien-Teh [Director & Chief Medical Officer of the Service]. [Edited by.] **North Manchurian Plague Prevention Service. Reports 1923-1924. (Being Volume IV. of the Series.)**—pp. vi+314. With 2 maps, 5 coloured plates & 29 illustrations.

This volume of reports, which is edited by Dr. Wu Lien-Teh, contains a number of articles on Plague, in addition to papers on such diverse subjects as "The incidence of certain diseases in Chinese and Europeans," "The serodiagnosis of syphilis," "Scarlet Fever in China," "How I built hospitals in China," "As a National Guest in Japan." The present review refers only to the articles on plague.

The first paper on this subject, entitled "A record of pneumonic plague outbreaks throughout the world from the earliest times," extends to rather more than one hundred pages, and may be regarded as a compilation, or historical study, of pneumonic plague outbreaks, or of epidemics of disease simulating pneumonic plague, which have been recorded in a number of countries in different parts of the world. The early records of this disease are culled from European sources, and it is disappointing to learn that this is necessarily so, because "no satisfactory records about the East can be obtained." One wonders whether this is really the case, or whether our ignorance is due to neglect to study existing records, for example, the records contained in old Thibetan sacred books referred to in another paper of the series.

The author's remarks on the epidemics of plague which are known to have prevailed in Transbaikalia, North Manchuria, and Mongolia are particularly interesting. He mentions some sixty outbreaks of this disease which occurred in Transbaikalia after the year 1863, and, from a study of these epidemics, he draws the following conclusions :—

"In the overwhelming majority of outbreaks, for which we have complete data, the initial cases were of the bubonic type. The preponderance of

axillary buboes is well marked." He attributes this latter phenomenon to direct infection while skinning wild rodents, and states that "the distribution of the buboes in the later cases shows a considerable number of inguinal in addition to numerous axillary and rare cervical ones," and it is his belief that these secondary cases are mainly infected through bites of human parasites which abound in the huts. "The rôle of the domestic rodents and their parasites has thus far," he states, "not been proved and seems improbable."

A perusal of the evidence on which these conclusions are based, however, is found to be exceedingly meagre; the author himself admits that the figures he has obtained "lack exactness in some respects."

There are also many accounts of outbreaks of plague in Mongolia after the year 1860, but, as the author points out, "the records were not collected by a trained personnel, but by occasional expeditions to the affected areas after the events, and thus often lack essential details."

It is not to be wondered at, therefore, that the author's conclusions from this historical study are vague. He believes "that meteorological conditions form only one link in a chain of extrinsic factors which favour the spread of pneumonic plague," certain "intrinsic factors" have also to be considered, "the character of the rodents and fleas involved, the changing nature of the plague organisms under varying circumstances, etc." It is his belief that these latter factors help to mould the character of epidemics and to explain why pneumonic plague appears almost regularly in certain districts and infrequently in others.

The reviewer believes that the author has not stressed sufficiently the influence of ignorance and of overcrowding in the spread of pneumonic plague, although, for example, he draws attention to these facts in connexion with the Manchurian epidemic in 1910. He points out that there the increased demand for tarabagan skins in the world markets attracted a large host of hunters to formerly infrequented districts. He states that the inexperienced Chinese hunters did not understand the danger of handling sick and diseased tarabagans, "hence they caught tarabagans indiscriminately with snares, and even congratulated themselves when they saw a sluggish one." "One sick animal," he points out, "might provide the spark for an epidemic." "Inexperience and overcrowding in underground inns would supply the necessary fuel for its spread." Had the author emphasized these points his findings would have been in accord with those of Petrie and Todd, who show that:—

(1) "Outbreaks of pneumonic plague take their immediate origin from patients with bubonic or septicaemic plague in whom a secondary pneumonia has supervened; they may assume the form of scattered foci in localities in which a bubonic epidemic is proceeding (mixed outbreaks) or they may occur as pure epidemics.

(2) "Ignorance of the means of self-protection, deficiencies in sanitary administration, and the absence of proper ventilation are the primary circumstances that encourage the spread of the disease."

The reviewer has stressed these points because the conclusions to be drawn from this historical study are so entirely at variance with the views recently advanced by Dr. Norman White in a report presented to the Health Committee of the League of Nations, in which he states, after an examination of all the available epidemiological data, that "the plague bacillus *alone* does not and cannot cause widespread epidemics of pneumonic plague. It seems more probable that there is an additional organism at work, or, in other words, the plague bacillus in symbiosis with another organism is responsible for epidemic manifestations of pneumonic plague, which is a disease *sui generis*."

A second paper by Dr. Wu on "Plague in wild rodents" was originally read at the Far Eastern Congress of Tropical Medicine held in Singapore in September, 1923. This paper contains many references to the literature on this subject. Tables are appended to the paper, which give: (1) A list of rodents known to suffer from spontaneous plague; (2) a list of rodents

not known to be naturally infected, but which are susceptible to plague infection; (3) the rodents of Transbaikalia; (4) certain cases of plague among tarabagans; (5) a list of fleas found on rodents suffering from natural plague.

A third paper by Dr. Akira Fujinami and Wu Lien-Teh is entitled "A study of the morbid histology of the 1921 Manchurian Plague Epidemic." The histological appearances of various organs in a number of cases of pneumonic plague are described and illustrated. A fourth paper contains "notes on the histological lesions found in organs of naturally plague-infected tarabagans." The notes are compiled on the examination of seven plague infected animals. In four of the seven cases acute broncho-pneumonia was noticed, which suggested to the authors that these particular animals had died of "pulmonary" plague; nevertheless, they conclude that the lesions so far observed seem to point to infection of the tarabagan through insects, as in rat plague, "the lung conditions being due to secondary invasions from other quarters." They, however, draw attention to the close association of tarabagan plague with primary pneumonic outbreaks in man.

A fifth paper, entitled "The original home of Plague," was first published in the *Japan Medical World* on January 15th, 1924. This paper, as the author, Wu Lien-Teh, remarks, is gathered from the work of past authors. He comes to the conclusion from a study of their writings that it is difficult to draw any sharp line as to where one focus begins and another ends. So far as Asia is concerned he holds the view that the whole central plateau is one large epidemic area, and affirms that here the virus is constantly kept alive among the various species of susceptible rodents which suffer from periodical epizootics. Such visitations in their turn result, at one time or another, in human cases. He stresses the point that the original virus may rest in wild, rather than domestic rats.

The last paper of plague is a summary of certain experiments with lice obtained from tarabagans. The author, Dr. H. Jettmar, states that the tarabagan louse can suck the blood of man, the ground squirrel, and the guineapig, but will not live on a strange host for any length of time.

In one experiment, by placing forty lice collected twenty-four hours previously from a dead plague-infected tarabagan on a healthy sirel (*Spermophilus Eversmanni* Brandt), he succeeded in infecting the animal.

W. Glen Liston.

Philippine Islands. **Proceedings of the First National Conference on Infant Mortality and Public Welfare. Organized and conducted by the Office of the Public Welfare Commissioner and held under the Patronage of His Excellency Leonard Wood, Governor-General of the Philippine Islands, Manila, 1921. December 6, 7, 8, 9, 10.**— 267 pp. With frontispiece and 9 plates. 1922. Manila: Bureau of Printing.

The opening words of the address of the Presiding Officer are surely sufficient to justify the object of the Conference, for he says: "Out of every thousand children born in the Philippine Islands, three hundred and twenty die under the age of one year." There is indeed work to be done, but one feels that the mind of the Filipino people has been truly set to the solution of the problem, and not without great hopes of success. It is known to a great extent where the causes of this sad state lie, and in most cases the appropriate remedy to ameliorate or, indeed, to abolish much of the evil is available.

As is so often the case, the main need is for education, for by that means alone can success be obtained. Legal enactments often fail in their object, but enlightenment of the populace brings into play just ordinary common sense—that most valuable asset in all sanitary reform.

At the beginning of the proceedings one reads in the paper on "Faulty Maternity Practices and their influence upon Infant Mortality," of superstitions, customs, mistaken practices and treatments which knowledge only can hope to abolish.

An interesting paper on "Infantile Beri-beri: its Causes and Remedies" states that this malady is responsible for more deaths than diseases of the respiratory tract, the digestive tract, meningitis, tuberculosis and tetanus combined. Valuable information and advice is given to mothers whereby they may recognise the early signs of the disease in infants, and wise counsels are propounded for the campaign against this most fatal malady.

An excellent illustrated paper was given on "Tuberculosis and the Child." Much that is mentioned is not only applicable to the Philippines, but is equally valuable in any part of the world.

An interesting sidelight is shown by a perusal of the discussion following the paper entitled "The Functions and Duties of a Health Officer"; apparently that much abused individual, the sanitary inspector, does not in all cases give satisfaction. It is, however, undoubtedly true that an efficient and tactful body of inspectors is an enormous asset in sanitary advancement, and may almost be described as the backbone of organization. The careful choice and adequate instruction of persons desiring to take up this branch of work is essential, and is a matter to which much attention and care is now given in this country in the preparation of men to take posts abroad in Colonial and other Services.

Amongst other papers of particular note one may mention "The Public Welfare Nurse and her Sphere of Action." Much wise advice, assistance and suggestions are therein contained; but one almost feels that here, too, as elsewhere, "woman's work is never done."

The papers throughout the sessions are generally to the point, helpful and practical, and will repay study by all those interested in the subject, whether lay or professional.

G. E. F. Stammers.

Stewart (Alan W.). [D.Sc., A.I.C., Demonstrator of Chemistry at the Royal Inst. of Public Health, London.] **A Manual of Practical Chemistry for Public Health Students. Especially arranged for those studying for the D.P.H.** 2nd Edition.—pp. x+83. With 16 figs. 1924. London: John Bale, Sons & Danielsson, Ltd., 83–91, Great Titchfield Street, W. 1. [Price 5s. net.]

This volume has been designed to supply the necessary practical chemistry exercises for D.P.H. students working under the present regulations.

It is evident that careful choice of methods has been made and the descriptions of the various processes are set forth adequately, clearly and concisely, but some important methods have been omitted. There is, for example, no mention of Haldane's apparatus for air analysis, nor of the Gerber or Rose-Gottlieb methods for the estimation of fat in milk. In view of the widespread use of Gerber's method in dairy and public laboratories some knowledge of the process is essential for public health students. In a paragraph dealing with the deterioration of bleaching powder we regret to find no reference to the prevention of this deterioration by the addition of quicklime. And there should now be no necessity for quoting American figures for the composition of flour when an authoritative series of British food analyses has been compiled by Plimmer and published by H.M. Stationery Office.

Actual mistakes are very few. In two places the word "nitrates" should read "nitrites"; the food value of milk refers to kilo-calories and not to gram-calories, as printed; and in the conversion data on page 77 several of the terminal decimal figures require correction.

The volume is usefully interleaved with blank pages on which the student may enter additional notes, and, though there is no index the table of contents is very full. Here and there the paragraphing could be improved and practically all the illustrations could be omitted without loss. It is difficult, for instances, to discover what teaching value can attach to an illustration of a Nessler tube or a measuring flask in a manual intended for actual use in the laboratory, while the illustration of the Paterson "Chloronome" on page 13 appears superfluous, as a similar illustration may be found amongst the advertisement pages.

Subject to these minor criticisms this book represents one of the best student's handbooks which we have seen of recent years, provided the student realizes and keeps in mind that it is intended solely as a laboratory bench book for D.P.H. work, and that it lays no claim to be a text book on public health chemistry.

J. A. Anderson.

Fowler (James K.). **An Impression of Jamaica and the Panama Canal Zone.**—60 pp. 1924. London: Eyre & Spottiswoode, Ltd., 9, East Harding Street, E.C. 4. [Price 2s.]

There is much matter in this little book and not a little humour, but our attention must be fastened on its serious professional interest.

The author visited Jamaica and the Panama Canal as one of many distinguished guests invited from afar by the United Fruit Company (of New York) to conjoin in a conference on the health problems of Tropical America, where so much of the productive work of the Company is carried on, and the Conference was duly held at Kingston (Jamaica) in the 11 days ending 1st August, 1924.

The Company is said to be the largest grower in the world, and for distributing its kindly fruits it has a line of steamships of its own; and thus being in such intimate and comprehensive touch with the realities of Mother Nature, it understands that sanitation pays. Thus possessed of wisdom and understanding it has set up, as a bulwark against tropical Nature, a Medical Department in which 50 doctors, 43 registered nurses, and 425 workmen are employed, and which includes in its very replete equipment pathological laboratories where disease can be investigated in its causes. When the Company takes over a new estate the first procedure is to erect a hospital and dispensary and mosquito-proof farm-buildings and labourers' dwellings, and to instal a water-supply and all necessary sanitary appliances. Schools, churches, and places for indoor and outdoor recreation also come within the ample sweep of the Company's provision for the mental, moral and physical welfare of its employees.

Of the proceedings of the Conference the author does not say very much. Of one of the items discussed, namely, the possibility, in the fullness of knowledge and sanitary experience, of the white races adapting themselves to a tropical habitat, he tells us that the Conference, "not without dissentient voices," was inclined to countenance it. He confesses himself to be among the dissentients, and supports his dissent with many familiar arguments—in the forefront of them Indian experience [which, however, is based not so much on any carefully studied effects of a hot climate on Anglo-Indian children as on difficulties of education in India, and particularly of moral education in an atmosphere pervaded by the gossip—at the best Rabelaisian—of native menial servants]. He also comments on Agramonte's challenge, made to Noguchi at the Conference, to decide the pathogenic status of *Leptospira icteroides* by inoculation of human volunteers.

In his impressions of Jamaica the author ridicules the relegation of sanitary responsibilities to Parochial Boards, and recommends that the powers and duties of Parochial Boards should be transferred for a time to a special Commission nominated by the Governor and approved by the Secretary of State for the Colonies. In his impressions of Panama he puts a heavy

stamp on a recent official recommendation to restrict expenditure on sanitation in the Canal Zone to the amount necessary to safeguard the health of American employees, and argues that the health of crews of ships using the Canal and of the settlers in the Zone are matters of such far-reaching import that they cannot and must not be ignored. He also has some pertinent criticism of the comfortable belief that because yellow fever is being suppressed in the Western Hemisphere that disease is on the way to complete extinction everywhere.

A. Alcock.

Neveu-Lemaire (M.). **Principes d'hygiène et de médecine Coloniales.** —pp. vi+278. With 133 figs. 1925. Paris: Société d'Éditions Géographiques, Maritimes et Coloniales, Ancienne Maison Challamel, 17, rue Jacob (VIe). [Price 16 francs.]

This admirable little book, though intended rather for the sojourner and traveller in strange lands than for the medical profession, can be heartily commended to the young doctor going to work in the overseas dominions. For sovran comprehensiveness combined with neat and effective concentration, it may be likened to the kingdom of infinite space bounded in a nutshell, of Hamlet's fancy. Of its fourteen chapters the first three are concerned with tropical climates in their physiographical aspects and in their direct and indirect influences upon the human framework; here among much that is useful to remember will be found also some speculations on the direct but retarded effects of the solar heat that will evoke dissent. The next seven chapters contain succinct accounts of the several diseases commonly known as tropical, grouped partly according to their malefic status and partly according to their geographical distribution and Continental limitation. This arrangement, though it disregards academic conventions, is quite concordant with the purpose of the book, and but for a few deliberate and avowed inconsistencies (*e.g.*, in the allocation of kala azar and rat-bite fever and sprue), is conveniently carried out. The descriptions of the individual diseases are models of precision, particularly in respect of the natural history of pertinent parasites and intermediary hosts and apposite measures of control, and are copiously illustrated by maps, diagrams, and artistic figures. A separate chapter is given to the cosmopolitan diseases as they occur in the tropics: this, of course, is sketchy though by no means perfunctory. A long chapter is occupied by the animals noxious to man in tropical regions, which are separately grouped as predators, parasites, intermediary hosts, animal "reservoirs," and venomous and poisonous forms. In a minimum of words, supplemented by excellent figures, this chapter imparts an enormous amount of information on the blood-sucking arthropods, the leeches, and the parasites (maggots, helminths, protozoa) and the various intermediate hosts not previously noticed in connection with the great endemic and epidemic diseases, and also on venomous snakes and fishes and venomous and poisonous invertebrate animals of many kinds. The penultimate chapter on some noxious tropical plants is meagre and unsatisfying, but the final chapter on domiciliary and domestic and personal hygiene is excellent both in matter and in manner.

A. Alcock.

TROPICAL DISEASES BUREAU.

SANITATION SUPPLEMENTS

OF THE

TROPICAL DISEASES BULLETIN.

APPLIED HYGIENE IN THE TROPICS.

By Lt.-Colonel G. E. F. Stammers, O.B.E., R.A.M.C. (retd.)

Supplement No. 2.] 1925. [July 30.

DISEASE PREVENTION.

League of Nations Health Organization. **Minutes of a Conference held in Singapore, from Wednesday, February 4th, to Friday, February 13th, 1925, inclusive, regarding the Establishment of an Epidemiological Intelligence Bureau for the Far East.**—35 pp.

In his report to the Health Committee of the League of Nations in 1923 Dr. Norman White wrote of the proposal to establish a "Central International Epidemiological Intelligence Bureau for the Far East" (*vide* Sanitation Supplement, March 30th, 1925).

As the Representative of the League of Nations Health Organization, Dr. Norman White was President of the Conference, and the following were present as delegates: Lt.-Col. J. D. Graham, I.M.S. (British India), Dr. P. A. Dingle (British North Borneo), Dr. L. Nicholls (Ceylon), Dr. S. C. Yin (China), Dr. A. R. Wellington (Federated Malay States), Dr. l'Herminier (French Indo-China), Dr. T. B Addison (Hong Kong), Dr. Ganzo Katoh (Japan), Dr. J. J. van Lonkhuijzen (Netherlands East Indies), Dr. H. F. Smith, as Observer (Philippine Islands), H.S.H. Prince Sakol (Siam), The Hon. Dr. A. L. Hoops (Straits Settlements). Dr. Gilbert E. Brooke was the Secretary.

The Conference made the following recommendations:—

"I. That the first appearance, in any port in Asia and Australia east of Suez, frequented by foreign trade ships, of indigenous cholera, human or rat plague, smallpox, yellow fever, or unusual prevalence or mortality from any other infectious disease, shall be telegraphed to the Bureau without delay.

"II. That a weekly telegram to the Bureau be sent not later than Wednesday morning of each week, referring to the previous week ending Saturday midnight. The contents of the weekly telegram to the Bureau should be as follows:—

(1) Total deaths from plague in important ports.
(2) Plague infection among rats in important ports.

(K2682) Wt P.157/183 1,625 7/25 H & Sp Gp 52

(3) Total deaths from cholera in important ports.
(4) Total deaths from smallpox in important ports. (Reporting of cases of smallpox where possible.)
(5) Particulars of any unusual epidemics in any part of the territory of the countries interested.

"The following is a tentative list of 'important ports' in the countries represented at the Conference :—

Bombay.	Singapore.	Belawan (Deli)	Hankow.
Calcutta.	Saigon and	Hongkong.	Darien.
Madras.	Cholon.	Manila.	Fusan.
Karachi.	Bangkok.	Foochow.	Yokohama.
Rangoon.	Batavia and	Amoy.	Kobe.
Negapatam.	Tanjong Priok.	Swatow.	Moji and
Colombo.	Sourabaya.	Canton.	Shimonoseki.
Penang.	Semarang.	Shanghai.	Keelung.
	Macassar.		

"III. That the letter confirming the weekly telegram, to be despatched by the first available post, shall contain also the following information :—

(*a*) Total deaths from all causes, in important ports.
(*b*) Number of cases of, as well as deaths from, each of the above-mentioned diseases.
(*c*) Supplementary information regarding plague, cholera, smallpox, or other unusual epidemic referred to in the weekly telegram.
(*d*) Any information of importance to the Bureau gathered from other sources such as Bills of Health, etc.
(*e*) Particulars of any infected ships which have arrived during the week, *e.g.*, name, nature of infection, whether treated or otherwise, whence come, and whither proceeding.
(*f*) Information regarding health conditions in ports of secondary importance, similar to that supplied for 'important ports,' wherever possible.

"IV. That all reports of public health interest dealing with the ports and territories as a whole, as well as copies of public health legislation, shall be sent to the Bureau in duplicate, *e.g.*, annual health reports ; reports from medical research institutes ; scientific papers ; municipal health reports of seaport towns, and monthly meteorological reports.

"V. That the Bureau telegraph to all far eastern governments and to Geneva each week, a resumé of all the telegraphic information it has received during the week from the countries in the Far East as well as other information of sufficient importance, and that emergency telegrams be sent to the countries concerned as circumstances dictate.

"VI. That the Bureau be authorized in case of urgency to telegraph information direct to any Port Health Officer in the Arena (the Eastern Arena includes all territory between longitudes 20° and 160° East of Greenwich, and latitudes 40° N. and 40° S.). When such action is taken, a duplicate telegram will be sent at the same time to the Central Administration.

"VII. That the weekly telegram be sent from the Bureau in code, and, if possible, broadcasted by wireless, on a fixed day and hour.

"VIII. That the communication confirming the weekly telegram emanating from the Bureau should take the form of a 'leaflet,' in which the health news, from any source, of interest to eastern countries, be incorporated, and that monthly and annual publications be also issued by the Bureau.

"IX. That, pending the completion of arrangements for a code, eastern administrations should arrange to telegraph summarized weekly information in plain language regarding health conditions, on the lines laid down in resolution No. II, as soon as possible after the return of the delegates to their respective countries. On receipt of this information the Bureau will commence broadcasting in plain language on a day and time which shall be duly communicated to all concerned.

"X. That an endeavour be made to obtain and distribute regular reports from Camaran, El Tor, Jeddah and Mecca during the time of pilgrimage.

"XI. That an endeavour be made to obtain regular information from Egypt and the east coast of Africa as far south as Cape Town.

"The Conference hopes :—

"XII. That the full co-operation of the various administrations of the Eastern Arena, not represented at the Conference, will be forthcoming.

"The Conference considers :—

"XIII. That some form of Advisory Council would be of great value to the development of the activities of the Bureau. Its constitution would naturally be international, and it is recommended that it function as a special commission of the League of Nations Health Committee to whom it would report. It would take note in an advisory capacity of any or all of the activities of the Bureau. It should meet once a year, and urgent questions arising in the intervals between sessions should be dealt with by correspondence.

"The Conference recommends :—

"XIV. That every facility be given by the Bureau to medical officers deputed by any of the Far Eastern administrations to study the work of the Bureau or to carry out investigations with the material available therein."

i. Mora (Damas). **Les organisations sanitaires en général. Organisation sanitaire de l'Angola.**—*Revista Méd. de Angola.* (No. especial 1ª Congresso de Med. Trop. da Africa Ocidental. Vol. 1. 1ª Sessão.) 1923. Aug. No. 4. pp. 173–183.

ii. Rodhain (J.). **Rapport sur l'organisation générale du service médicale au Congo Belge.**—*Ibid.* pp. 185–191.

iii. Vassal (J.). **Aperçu général sur l'assistance médicale indigène en Afrique Equatoriale Française.**—*Ibid.* pp. 205–206.

iv. Vassal (J.). **Utilisation des noirs en Afrique Equatoriale Française comme auxiliaires du Service de Santé.**—*Ibid.* pp. 221–225.

v. Heckenroth (F.). **L'oeuvre d'assistance médicale indigène en Afrique Occidentale Française.**—*Ibid.* pp. 207–219.

The first session of this, the first Congress of Tropical Medicine of West Africa was occupied by the consideration of the sanitary organization of the West African Colonies; seven papers in all were contributed.

i. Dr. Damas Mora, Chief of the Health Service of Angola, read an excellent paper. Points made were that the preventive side of sanitary organization must take precedence of the therapeutic; that scientific research must be prosecuted on a large scale; that epidemics of diseases which cause much alarm and on which money is spent freely, such as plague, are rarely so destructive as those which are always present—malaria, tuberculosis, dysentery, hookworm, pneumonia; that the health service ought always to be completely mobilized. The sanitary organization of Angola was military till 1919, when it was put on a civil basis. The figures of the personnel, full complement and actual, are as in the Table :—

	Doctors.	Pharmaceutists.	Lab. Assistants.	Infirmiers and Infirmières.	Midwives.
Complement	80	19	20	170 +107 (native)	2 +2 (native)
Actual ...	51	14		115 +76 (native)	

A committee is providing for the foundation of an Institute of Scientific Research and arranges for the publication of the *Revista Médica de Angola*. Doctors who attend specialist courses while on leave are paid as if they were on service in Angola and, if they are working abroad, an additional sum of £2 per diem. There are three laboratories for clinical research and several portable laboratories (laboratoires portatifs). Every six months £820 worth of quinine is received from Holland and distributed gratis. There is a small pharmaceutical laboratory, where tablets, ampoules and other medicines are prepared, which has effected a saving of 150,000 crowns yearly. The personnel requires to be largely increased in all its grades; it is calculated that three to four thousand native infirmiers are needed! Advances for the immediate future are: a distinction between medical and sanitary officers, the creation of a native school of medicine, the study of the distribution of infective diseases in the Colony, the organization of a medico-legal service.

ii. Dr. J. Rodhain, Principal Medical Officer of Belgian Congo, reported on that country. After the war the medical service was reorganized, to consist of three categories of doctors: administrative; medical officers at stations or itinerant; specialists, hygienists and parasitologists. On the administrative side, besides the P.M.O. and his deputy, attached to the Governor-General, there is in each of the four Provinces a medical officer assisted by one or more travelling medical inspectors. The hygienists at present number only two, in the Katanga and Congo-Kasai provinces where the Europeans are densest and large numbers of natives are employed; they are concerned chiefly with industrial hygiene. Three laboratories are now in being, at Leopoldville, Elizabethville and Stanleyville; a fourth will be placed at Coquilhatville. The itinerant doctors, who should number 48, are actually only 20, and these are all engaged on sleeping sickness prophylaxis. They and six others are specially concerned with the care of sick natives. There are 11 private doctors with whom the Government has contracts for the care of its agents and of natives. The medical personnel in the Colony should number at least 100, apart from absence on leave. Actually, there are 90,

leave provision included. Apart from sisters of religious missions, there are 24 infirmières. The European assistants who, the author says, correspond in part to our sanitary inspectors and in part to the French military infirmiers, receive, like the infirmières, instruction at the Brussels school of tropical medicine, and afterwards at the hospitals and laboratories of Leopoldville and Elizabethville. Promotion is dependent on the passing of tests. There are now 22 European assistants and 4 pharmaceutists. As to native auxiliaries there now exist in the Colony six schools, where natives receive a three years' course in which they learn, *inter alia*, how to diagnose microscopically trypanosomiasis, common helminth infections, and tuberculosis. There are not, at present, any native midwives. Great difficulties are the want of education in the pupils and their lack of moral qualities. These schools are the first step towards the training of native doctors, an essential task. "Nous devons venir en aide aux indigènes par les indigènes." An auxiliary service for the care of natives is formed by missionaries. They receive the same training as the European assistants. They have to furnish reports, and are under the control of the service of hygiene of their province. They are provided with microscopes and a yearly supply of drugs. There are now 15 missionary doctors and 30 unqualified missionaries.

The budget for 1923 was 12,500,000 francs, and 1,800,000 for purchase of equipment. The scale of pay for all grades is given in an Appendix.

iii. Dr. J. Vassal, Director of the Health Service, French Equatorial Africa, contributed a short paper. The medical organization of this country, which comprises four colonies, dates from 1910, when the service was military. There are now 7 doctors for the native service in Moyen-Congo, 4 in Oubangui-Chari, 9 in Gabon and 2 in Tchad. Native infirmiers are numerous. The doctors charged with sleeping sickness prophylaxis give aid to the natives, vaccinate, treat syphilis and yaws and look after the hygiene of the villages. The military and railway doctors, and doctors attached to companies and missions have a share in this work. The scarcity of the personnel is a great drawback; the utilization of native assistants would remedy this, but the number of educated natives is insufficient. "The advance of native assistance and of native education is bound up together." In 1922, 126,157 vaccinations were done, and 28,589 persons were treated for sleeping sickness. In the budget for 1923, 2,480,984 francs were provided, one-tenth of the total expenditure. [If the figures are correct the proportion is one-twelfth.]

iv. Dr. Vassal reported also on the employment of the natives of French Equatorial Africa as auxiliaries of the health service. Here there are no native doctors of any grade. The mental and social status of the population is not sufficiently high for the foundation of a school of medicine. But the natives make useful infirmiers and acquire much dexterity; their help is essential for the hygienic advance of the country. (Quelle chimère de vouloir continuer à sauver l'ensemble des Noirs par les Blancs!) In sleeping sickness prophylaxis the administration of atoxyl to old cases has been entrusted to them; the alternatives are to make such use of natives or leave the sufferers untreated. The most intelligent natives come from Gabon and Loango. An attempt is being made to use the native women as infirmières and midwives and a training school has been started at Libreville.

v. Surgeon-Major F. Heckenroth, Inspector of Hygiene of French West Africa, discussed the arrangements for native medical assistance in that country, which comprises eight colonies, five of which are maritime. Twenty years ago they were grouped under a Governor-General resident at Dakar. This vast country of 3,500,000 square kilometres holds a population of about 12,000,000. The hospital beds at disposal number 2,500, a proportion of which are for lying-in women. Laboratories are working now in Senegal, the Soudan and the Ivory Coast; that at Dakar has become the Institute of Biology. There are, for the manufacture of vaccine, 11 centres which furnish sufficient lymph to vaccinate a million persons yearly; they are directed by doctors or by veterinarians. The Dakar School of Medicine, founded in 1918 (*loc. cit.* Vol. 21, p. 310), is turning out native doctors and pharmaceutists and native midwives. To co-ordinate the sanitary administration of the various colonies a Central Bureau for the general inspection of sanitary and medical services was created, charged with the control of the existing organizations and the study of their improvement, at the head of which is the Surgeon-General, who is also Inspector-General of the sanitary services. He has a medical assistant and an Inspector of Hygiene, whose duty it is to inspect and survey the services of hygiene and prevention in the colonies of the group. The Inspector-General is the technical adviser of the Governor-General who can also consult a number of Committees. The personnel of the native medical assistance comprises 99 doctors, but 18 of these are employed in hospitals, and 5 are specialists, leaving 76 for general purposes. This is a decline from the figures before the war, which were then too small. At the end of 1923, 15 native doctors were expected to complete their course of training, and four years later 54 would be available. Of the native midwives 28 were already (1923) on duty, some at hospitals in the chief towns, others in the interior where maternity hospitals are being erected alongside the dispensaries. The infirmier personnel consist of 18 male and 4 female Europeans and 393 natives. There are 57 vaccinators, 226 "gardes d'Hygiene," and 45 "gardes sanitaires." In 1922 the amount spent on the native medical assistance was just under 10,000,000 francs.

The author proceeds to discuss the results of these activities. Apart from the increased figures of hospital attendance smallpox has almost disappeared; for 10 years more than a million persons have been vaccinated yearly with the local lymph; in remote regions dried vaccine has been used, at greater cost, but with good results. Yellow fever has become rare and much has been done to combat malaria. At Dakar there are 8 quinine distributers, who visit the houses from May to November and see the quinine swallowed three times a week by children under 15; in the schools the masters are the distributers. Sleeping sickness has become rarer. In the case of plague which appeared at Dakar in 1914 there is a standing campaign against rats, of which 700,000 to 800,000 are killed yearly in Senegal. In the case of other diseases success has been less, *e.g.*, leprosy, tuberculosis, syphilis. There are some 12,000 lepers, only a few hundreds of whom are segregated. The prophylaxis of syphilis has hardly been outlined even in the towns.

The paper ends with some forecasts of improvements. Much is expected from the collaboration of the native doctors and midwives; it will set the European doctor free from constant dispensary attendance

and allow him to traverse his district and study its needs. A motor car must be put at his disposal; there are already 8,000 kilometres of roads. The best type of car has not yet been devised.

A. G. B.

LETONTURIER. **Notes sur l'Assistance Médicale Indigène dans les territoires du Cameroun.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop da Africa Ocidental. Vol. 2. 2a Sessão.) 1923. Aug. No. 4. pp. 351–358.

The author remarks that although the German medical organization of the Cameroons was good its working apparatus had been destroyed before the French occupation. The German medical estimates for 1914 amounted to 510,400 marks; the French medical budget for 1923 was estimated at 1,144,874 francs, under the following heads: Salaries, wages and allowances, 533,146 fr.; medical material and other provision for the sick, 541,500 fr. (*exclusive of* 70,228 fr. for public health purposes and 245,523 fr. for sleeping-sickness prophylaxis); leprosaria, 44,228 fr.; vaccines, sera, etc., 26,000 fr. Buildings, construction, and transport are not included in these estimates.

The medical personnel of the Cameroons forms an autonomous department of the Government. It consists of a D.G., a Sanitary D.D., 14 military M.O.'s, 2 civil M.O.'s, 1 railway M.O., and a pharmacist, and a subordinate medical establishment of 110 hospital assistants, of whom 10 are European (2 of them ladies), and the rest native. Of these last the value is variable; some of the older men are very good, and a few are "auxiliaires précieux."

In the chief centres of the territory 8 general hospitals are distributed having a total accommodation (beds) for 49 Europeans and 488 natives; in the suburbs of the capital there are also 3 dispensaries. Other district accommodation for the rural sick makes up a total of 5,000 "lits de hospitalisation." For vaccination there are two centres, from which 310,000 doses of vaccinia pulp were issued in 1922. A beginning has been made with provision for maternity, but so far only desperate cases have applied for attention.

A. A.

LE DANTEC (A.). **L'Hygiène Sociale à Dakar.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2a Sessão.) 1923. Aug. No. 4. pp. 309–348. With 2 charts. [4 refs.]

Dakar, the capital of French West Africa, is a city and port of 32,000 inhabitants (exclusive of the naval and military establishment), of which 2,500 are Europeans and 29,500 are natives. The marine and military, of course, live under strict sanitary rule, but the civilians of all races are mingled in insanitary confusion. The necessity of segregating an ignorant native population indifferent to the blessings of hygiene is, of course, recognized, and something in that direction has been begun; but it will be long before it is accomplished, and meantime the official sanitary defensive is organized and adapted for existing conditions.

The Dakar Institute of Social Hygiene is grafted on the Dakar School of Medicine, and is financed by Government. It appears to exercise its sanitary influence mainly by the steady, silent, permeation of its dispensaries. These, which are nine in number, make several

provisions for general medical cases ; surgical cases ; eye, ear, pharynx and teeth ; skin ; tuberculosis ; venereal disease ; gynaecology ; pregnancy and approaching maternity ; and nurslings. The tuberculosis dispensary includes a laboratory for tuberculosis research. The venereal dispensary includes a proselytizing agency and a service for (non-obligatory) inspection of unfortunate females. The skin dispensary includes lousing apparatus. The infants' department includes a crèche and a hospital annexure. Some useful domiciliary sanitation is effected through Sanitary Visitors, provided by the School of Medicine ; these visitors help at the dispensaries, where they get to know the patients and to establish that mutual confidence which is the basis of progress. A good point d'appui is also afforded by the schools, where sanitary inspection has been established.

A. A.

d'Anfreville de la Salle. **L'Organisation de l'hygiène coloniale.**—*Ann. d' Hygiène Publique Indust. et Sociale.* 1924. Nov. New Series. No. 11. pp. 676–685.

This is an argument in favour of the general independence of the public health service. The author points out that even in France the interests of hygiene are subordinated to local politics, and that this is much more the case in the colonies, where the medical officers are all under official control. He admits that much has been done for the sanitary improvement of the French colonies, particularly in North and West Africa, and that there are and have been Colonial Governors of exceptional wisdom and ability who have actually initiated great sanitary reforms ; but on the whole the French and also the British colonies and dependencies have not reached the standard set by the United States of America. To attain this standard not only should the colonial medical officer be as much a hygienist and a man of affairs as a clinician, but there also should be in every colony a public health service, the subordination of which to the local government should be definitely regulated by statute. A given territory should be divided into districts (every important town to rank as a district), each with its sanitary officer commanding, under the supreme head. This public health corps should have its own subordinate staff of inspectors, vaccinators, disinfectors, and a considerable number of workmen ; also its own laboratories, as well as certain rights of call on the dispensaries of the ordinary medical service. Big schemes of sanitary engineering would be undertaken by its desire. A local administration, even the general public, could never ignore the recommendations of such an august hierarchy of Hygiene. But only with the recognition of the Public Health Service as an autonomous department of the State will the colonial hygienist be able to put his heart into his noble calling.

A. Alcock.

Olitzki (Leo). **Die sanitären Einrichtungen Palästinas.** [The Sanitary Organizations of Palestine.]—*Deut. Med. Woch.* 1925. Mar. 6. Vol. 51. No. 10. pp. 402–403.

The author describes the institutions for the furtherance of hygiene and discusses the chief diseases of Palestine. Leaving aside the organizations for which the Mandatory Power is responsible, the chief of the Zionist societies is the Hadasseh Medical Organization.

This maintains four hospitals and a variety of hygienic establishments—polyclinics, a school medical service, advice and care for mothers and infants, a nursing school, laboratories: all transitional, to be taken over later by the Colony and the municipalities. The staff consists of 50 doctors. The Kupath Cholim is a Sick Fund (Krankenkrasse) created by a Jewish workers' organization, and maintained by the contributions of the members. Its doctors and officials work together without friction. It is concerned chiefly with the agricultural districts. Another important institution is the Pasteur Institute. Its functions are the preventive treatment of rabies, which is common, the production of vaccine lymph and bacteriological and serological work. Other institutions are described, such as the Schaare Zedek Hospital, where cases of typhus and relapsing fever are treated.

Of the diseases of Palestine the author tells us nothing that has not been already put on record.

NEWSHOLME (Arthur). **Disease Records as an Indispensable Means of Disease Prevention.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 940–945. [United Fruit Company, Boston, Mass.]

In this communication the importance of statistics in disease prevention is emphasized. As the writer says, this subject forms a chief corner stone on which efforts for the prevention of disease are built. It was the statistics of the incidence of "fever" in England, in the early forties of the nineteenth century, which impelled the adoption of the important English sanitary reforms, and their sequential adoption in in all quarters of the world.

Theoretically, it might be considered possible to reduce the incidence of a preventable disease in the absence of exact knowledge of its presence, its amount and its local distribution, but experience shows that such action, on the strength of scientific knowledge, apart from the pressure of a known evil, is seldom effective and continuous. The most efficient spur to action is the disagreeably obtrusive notification of each case of disease and its official record in reports published at short intervals.

In no instance has striking reduction of a disease been secured without knowledge of its general incidence, and it may be asserted generally, as an axiom in sanitary practice, that the pointer to prevention has always been the occurrence of disease.

In tropical regions difficulties in ascertaining the occurrence of disease are exceptionally great. There may be no complete registration of deaths and their causes; and except on plantations on which good organization prevails, including the provision of medical attendance for every employee, notification of cases of infectious diseases is likely to be very incomplete. The desiderata are:—

(1) A statement of the population at risk, distributed according to sex, and if practicable in age groups.

(2) A record of the number of births occurring in each locality, as without this a completely trustworthy statement of infant mortality cannot be made.

(3) A record of the number of deaths, the cause of death, if possible, being medically certified.

By such means the main conditions of the healthfulness of a district or plantation may be gauged.

The above are, however, inadequate for satisfactory disease prevention; for this, it is essential that immediate notification of each case of preventable disease to a responsible medical officer be effected. Each notification is a pointer; it shows a possible centre of infection. Notification itself is of little use unless each case is regarded as the starting point of an epidemiological investigation with a view to the discovery of overlooked or concealed cases. This last implies field work, and *field work is the essential element in the practice of preventive medicine.* Accurate field enquiries must be undertaken, and action is never satisfactory which is not based on the correlated facts ascertained by the intelligent study of these field observations.

FISHER (V. M.). **Medical Arrangements for Native Labour on the Thika-Nyeri Railway Construction.**—*Kenya Med. Jl.* 1925. Jan. Vol. 1. No. 10. pp. 293–320. With 12 figs.

The monthly average of labourers employed during 1924 was 3,750, and in 1925 the figure was 2,000. The labour camps varied from 20 to 33 in number, and the population of each camp ranged from 50 to 800 persons. The larger camps were divided into sections, each separate from the other, in such a way that in no case were there more than 400 men in any one section. The camps were sited, built and maintained in accordance with the "Appendix to Specifications." The conditions were carefully and strictly enforced by inspections carried out frequently and regularly by the Railway Magistrate, and more occasionally by the medical officer.

The "Appendix to Specifications" includes the following:—

1. "*Rations.*—All African labour will receive:—

"Maize meal	2 lbs. daily.
"Meat	½ lb. daily.
"Chiroko or Beans	¼ lb. daily.
"Ground Nuts	1 oz., or Ghee ½ oz. daily.
"Fresh vegetables	1 lb. weekly.
"Salt	1 oz. weekly.

"('Fresh vegetables' includes bananas, sugar cane, potatoes, sweet potatoes, Muhogo or pumpkin)."

The above scale was worked out by the Medical Department, and though approved of by the Native Affairs Department and the Uganda Railway it was subsequently cancelled and an inadequate and lower scale was substituted.

The opinion is expressed that while no case of definite food deficiency occurred, yet it is probable that inadequate diet was one of the chief causes, or at least a contributing factor, of the disabling ulcers so frequent amongst the labour.

"Cooking pots and fuel will be supplied by the contractor, and one cook for every 20 men."

The system of cooks worked well.

2. "*Water Supply.*—The contractor will undertake that all his labour receives an adequate supply of water, both in camp and on the work. Labour must be prevented from fouling any water supply. Failure in this respect will necessitate water guards, the cost of which will be charged to the contractor."

There was at all times a supply of water that was satisfactory in quantity and quality. No case of fouling a water supply arose.

3. "*Camps.*—All camps must be sited by the Medical Officer. The site of the camp must be levelled, and all grass entirely removed,

over an area extending at least 30 feet from the outside row of huts. The type of hut *recommended* is that known as the ' kongoni,' as shown in the accompanying sketch. The approved dimensions of such a hut are : Length, 20 ft. along the side, excluding the rounded ends ; width, 16 ft. ; height, 14 ft. This will house 20 men. No other dimensions for a hut of this type will be approved.

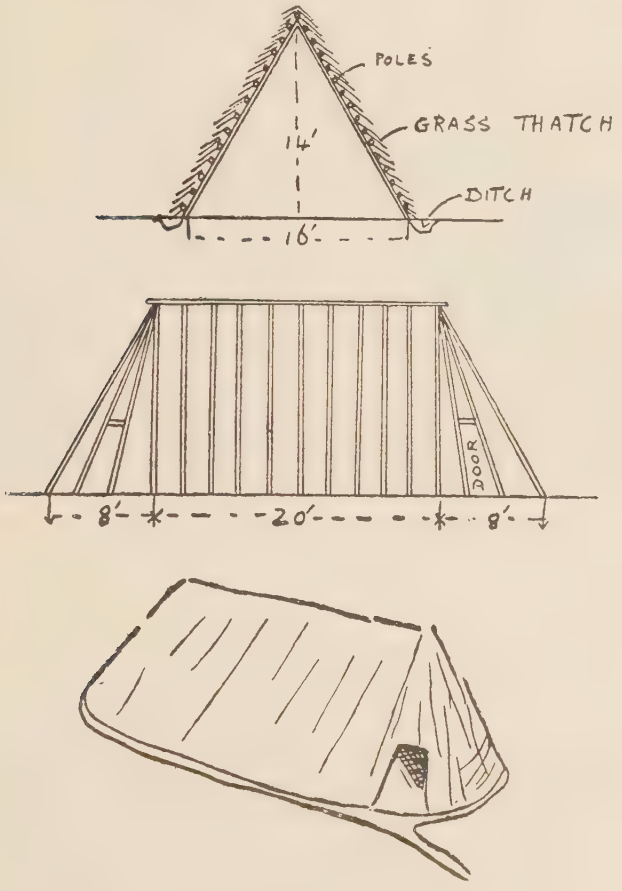


Fig. 35.—The " Kongoni " Hut recommended for use in native Labour Camps on the Thika-Nyeri Railway Construction, Kenya. This will house 20 men.
[Reproduced from the *Kenya Medical Journal*.]

" If round huts are built they should be 16 ft. in diameter with 4 ft. walls, and a roof at an angle of 60 degrees. Cubic space per man must be at least 150 cubic feet in grass-walled huts, 200 cubic feet in mud-walled huts.

" Any other type of housing accommodation must be approved by the Medical Officer before use.

" Huts must be at least 30 ft. apart.

" Not more than 400 men may be housed in one camp. If more labour is required to be housed in any area separate camps must be made at least 100 yards apart.

"Adequate drainage must be provided, and all camps must be kept in a thoroughly clean and sanitary condition. Refuse must be burned or buried.

"The contractor must appoint a person of authority who will be in definite charge of each camp, and responsible for all discipline, cleanliness, sanitation, and internal administration, and who can carry out all instructions issued to him on these matters by the railway or medical authorities."

The points requiring consideration in the selection of camp sites were those usually appertaining to the matter in a tropical climate; they do not need special mention. The "kongoni" type of hut was found satisfactory. Corrugated iron sheeting was used by one contractor on the understanding that one sheet was used for each man; as a rule the sheets were used for roofing, but on emergency could supply temporary shelter: it was found to be satisfactory.

4. "*Latrines.*—Latrines must be provided to the extent of 3 per cent. of the labour in camps to be occupied for one month or less, and 5 per cent. in other cases. They will be of the deep pit type, at least 10 ft. deep, with an opening 8 by 10 inches. In rocky ground, where deep pits are impossible, shallow trenches, or pans and incinerators may be used. The latrine must be enclosed by a fence at least 4 ft. high. No hut shall be situated more than 100 yds. from the nearest latrine. A proper path must be made from the huts to the latrine. The ground round the latrine must be cleared, and kept clear, of bush and grass. The contractor may be given help in supervising the construction and maintenance of the latrines, and sweepers will be supplied when necessary to keep them in a clean condition."

Latrines were the outstanding failure in camp organization, it being found impossible to make raw natives use them. Owing to lack of experience in their use, fouling round the hole at once occurred, with the result that each fresh comer moved further and further away. Gradually, the latrines became centres of masses of faeces spread radially around, till approach became almost impossible. Latrines continued to be insisted upon, but rather in the hope of educating the more intelligent of the labour than with the idea of their being of any great sanitary value.

The remaining matters with which the "Appendix to Specifications" deals do not require comment.

Medical Arrangements.

It was found in Kenya, that on railway construction 1½ per cent. of beds to the maximum of labour strength is sufficient accommodation to provide. Such scale of provision may need to be modified to meet local conditions; it is, however, a difficult thing to find out the comparative healthiness of a tract of country which is often more or less unknown before the advent of the railway. The location of hospitals and medical aid naturally depend upon local conditions of constructive railway work, and will be governed by such.

As regards hospital planning, the best type was considered to be the radial or some modification of it, owing to the economy in space required and ease of supervision.

The type of hospital wards, etc., may be seen from the illustrations reproduced below.

A standard ward is 30 by 16 by 14 ft. high, with a floor space of 480 sq. ft. and a cubic content of 4,000 c. ft.; it contains from 12 to 16 beds.

Of the diseases, the following were of greatest import: Pulmonary disease, including the pneumonias, influenza, bronchitis; diarrhoea and dysentery; fever, which in this construction consisted of about

Fig. 36.—A Standard Hospital Ward used on the Thika-Nyeri Railway Construction, and allowing of 12 to 16 beds.

Fig. 37.—An Outpatient Dressing Hut used on the Thika-Nyeri Railway Construction. It measures 20 ft. by 8 ft. by 12 ft. high. The door is 10 ft. wide to admit a stretcher sideways, and the centre table is long enough for an unconscious patient or one with a broken leg. Seats with foot rests are fitted at both ends of the hut.
[Reproduced from the *Kenya Medical Journal*.]

90 per cent. subtertian malaria; and ulcer. These four groups together accounted for about 75 per cent. of all admissions. The average stay in hospital was as follows: Pulmonary disease, 6·93 days; diarrhoea and dysentery, 5·57; fever, 5·39; and ulcer, 21·8 days.

Tomb (J. W.). **A Note on the Outdoor Organisation of the Asansol Mines Board of Health.**—*Indian Med. Gaz.* 1925. Apr. Vol. 60. No. 4. pp. 156–160.

The Asansol Mines Board of Health, which is constituted under (Bengal) Act II of 1912, was brought into active existence by Government in the early part of 1916 to prevent "the outbreak and spread of dangerous epidemic disease" in the Asansol Mining Settlement. Within the Settlement are included 200 collieries, 490 villages, and 2 municipalities, the total population being, according to the Census of 1921, 329,353.

The chief epidemic diseases are cholera and smallpox, plague being unknown in epidemic form.

The unit of administration is the circle of the Sanitary Assistant, which is about 36 sq. miles in area. Thirteen Rural Sanitary Assistants are employed; their duties are:—

1. To collect the vital statistics of the circle from the village chowkidars (watchmen) at the weekly chowkidari parade held at the police station.

2. To verify these occurrences during the week.

3. To submit a weekly report on the sanitary condition of the villages visited and inspected while verifying the returns of births and deaths received from the chowkidars or otherwise.

4. To receive reports of outbreaks of cholera, smallpox or plague, and to take immediate steps for its repression.

5. To vaccinate during the first year of life all children born in the circle and all other persons found unvaccinated or requiring revaccinating.

6. To give lectures on elementary hygiene in the primary schools of the circle.

7. To make certain that the burning ghats (cremation places) are kept in good order by the staff maintained by the Board for that purpose.

All members of the outdoor staff are required to maintain bicycles, for the purchase of which money is lent free of interest by the Board, and each member receives a monthly bicycle allowance of Rs. 10.

Experience has shown that practically all deaths are reported in the Mining Settlement as checked by the number of bodies disposed of at the burning ghats. About 2 per cent. of births remain unreported.

A permanent register of corrected returns of births and deaths is kept by the Sanitary Assistant; one copy is sent each week to the office of the Mines Board for record, and another copy is sent to the police for forwarding to the office of the Civil Surgeon of the district. Weekly report is also made by the Sanitary Assistant to the Chief Sanitary Officer. This report gives information on the following:— Name of village. Date of visit. Object of visit. Whether or not

any epidemic was found. Number vaccinated. Water supply. Condition of burning ghat. General sanitary condition. A yearly report details the villages in the circle that are in the most urgent need of wells.

For the immediate reporting of cases of cholera and smallpox the chowkidars are provided with coloured postcards. For cholera a red card is used, the name of the village and of the chowkidar having been written in by the Sanitary Assistant when distributing the cards; for smallpox a green card is provided. On receiving information of a case in the village the chowkidar at once starts off on foot to the office of the Sanitary Assistant, which in the Mining Settlement is in no instance more than six miles away. If the Sanitary Assistant happens to be out, the chowkidar places the card in a special glass-fronted box outside the office door where it cannot fail to be noticed.

In the case of smallpox no attempt is made to isolate the patient, as this is impracticable in rural health work in India. Reliance is placed wholly on wholesale vaccination and revaccination, a procedure which experience has proved to be eminently satisfactory. The Sanitary Assistant immediately reports all such cases to the Sanitary Inspector of his circle and to the office of the Mines Board of Health on a form having the following special headings: Date of onset of fever. Date of outbreak of eruption. Date of notification by chowkidar. Date of previous protection (if any).

In the case of cholera, if the patient is not already under medical treatment, the Sanitary Assistant prescribes 8 doses of an essential oils' cholera mixture (details of this are given in the *Indian Medical Gazette* of June, 1923, and May, 1924; see this *Bulletin*, Vol. 20, p. 737). One prophylactic dose of the same is given daily to each inmate of the infected house until the patient is clinically recovered; actual attendants on the case receive two doses daily. Since this procedure was adopted three years ago no second case of cholera has occurred in any house in the Mining Settlement. Reports are made as detailed above under smallpox, the special heading in the case of cholera being: Date of notification of case by chowkidar. Date and hour of attack. Date and hour of arrival of Sanitary Assistant. Whether case was found collapsed or not. Treatment. Result.

Vaccination Registers are kept in bound volumes issued to the Sanitary Assistants, who enter therein all births and the subsequent vaccination of the children within one year of birth; every effort is made to revaccinate young adults, especially girls before *purdah-nashin* age. Smallpox has been practically abolished from the Mining Settlement owing to vaccination efficiency, the death rate from the disease in 1922 being *nil*.

The Sanitary Assistant also gives weekly lectures in Bengali in the primary schools of his circle; the subjects are: 1. The Importance of a Pure Drinking Water. 2. Cholera. 3. Typhoid Fever. 4. Dysentery. 5. Malaria. 6. The Importance of Quinine in the Prevention and Cure of Malaria. 7. Smallpox. 8. Plague. 9. Consumption. 10. Flies. 11. Hookworm disease. A primer (printed at the expense of the Board) is distributed free to all scholars; periodical examinations are held; and suitable book prizes are awarded annually.

There are six fully qualified Sanitary Inspectors who supervise the work of the Sanitary Assistants, each Inspector having as a rule two Sanitary Assistants under him. The collieries are in the sanitary charge of the Sanitary Inspectors who, in the case of epidemic disease

arising, take similar steps for the collieries as do the Sanitary Assistants for the villages. Lectures on public health are also given during the cold weather and in epidemic times by the Inspectors. The Board also employs an anti-malarial staff consisting of six selected Sanitary Assistants who have been specially trained in the necessary entomological methods. A staff of three midwives is maintained, who reside on collieries in different areas of the Settlement. For the medical inspection of school children a qualified Sub-Assistant Surgeon is employed.

The organization of the Mines Board of Health has been elaborated to meet the special requirements of the Mining Settlement. For ordinary district public health work a considerably less numerous staff would suffice, which could be maintained on a sum representing less than one anna per head of the population per annum.

As an illustration of the value of the work that can be accomplished by such an organisation the subjoined table, compiled from the weekly return of vital statistics in the *Calcutta Gazette* for 1923, is eloquent:—

Death Rates per Thousand.

	Calcutta.	Howrah.	Dacca.	Maniktolla.	Asansol Mining Settlement.
Cholera	1·00	1·19	1·32	0·99	0·56
Smallpox	0·17	0·09	0·02	0·28	0·015
"Fever"	4·09	8·22	11·21	5·46	2·10
Diarrhoea and Dysentery	2·24	4·44	2·54	3·69	0·83
Respiratory diseases ...	8·91	6·47	2·98	10·24	3·75
Total	28·40	28·64	28·33	31·63	17·97

The Asansol Mining Settlement was once such a hot bed of disease as to necessitate for its sanitation the establishment of a special Board of Health, the population being annually decimated by a regular succession of epidemic diseases—cholera, smallpox and malaria, in the order named. All that is now changed, and the Settlement is probably, at present, the most salubrious area of its size in the plains of India, with a death rate which compares favourably with that of many countries in Europe.

Watson (Malcolm). **Observations on Malaria Control, with Special Reference to the Assam Tea Gardens, and some Remarks on Mian Mir, Lahore Cantonment.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1924. Oct. 23. Vol. 18. No. 4. pp. 147–153. With 15 figs.

This paper, with fuller lantern demonstration than would perhaps be gathered from the printed word, emphasizes the necessity of ascertaining, first the anopheles implicated in conveying malaria in any particular area, and then the conditions essential for its larval development; so that such measures as tree cutting may not unwittingly be carried through in an area where the main transmitter abhors shade for its breeding places.

Of general applicability is the principle of deep subsoil drainage, the drain either open or buried, according as to whether, at the altitude

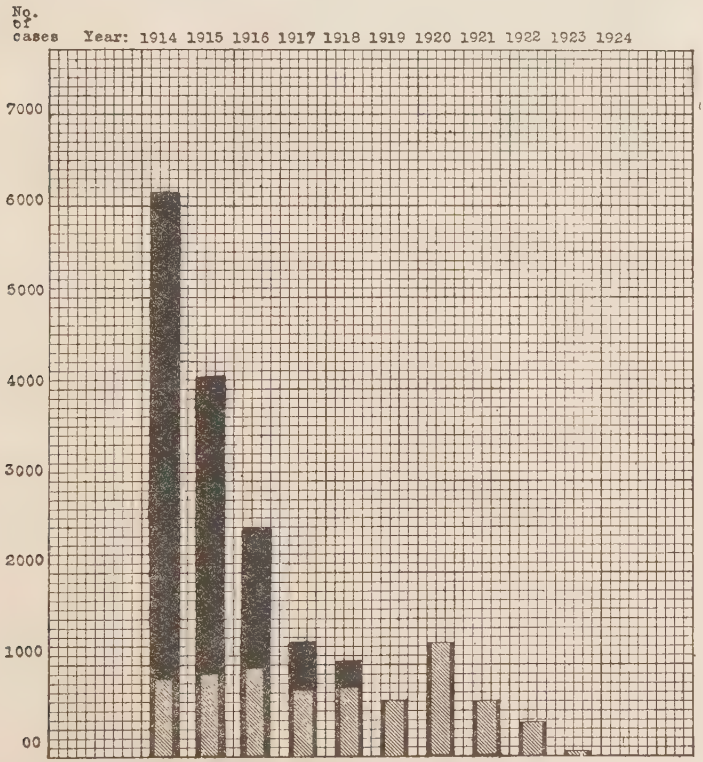
and in the circumstances generally, the former will not or will produce breeding places for locally dangerous species. The lantern slide illustrating the enormous potentiality of a centrifugal pump to get rid of water undrainable by gravity, was particularly striking. It was insisted upon that no method could be immediately effective unless it depended but little on education, and it was noted that the anopheline potentiality for long flight had not in practice been found to determine the extent of clearing requisite round coolie lines. This was settled by the actual discovery of infection as determined by the splenic index, and extended to about half a mile.

Clayton Lane.

Watson (Malcolm). **Malaria in the Malay Peninsula.**—*Bull. Rubber Growers' Assoc.* 1925. Apr. Vol. 7. No. 4. pp. 229–234. With 2 charts in text.

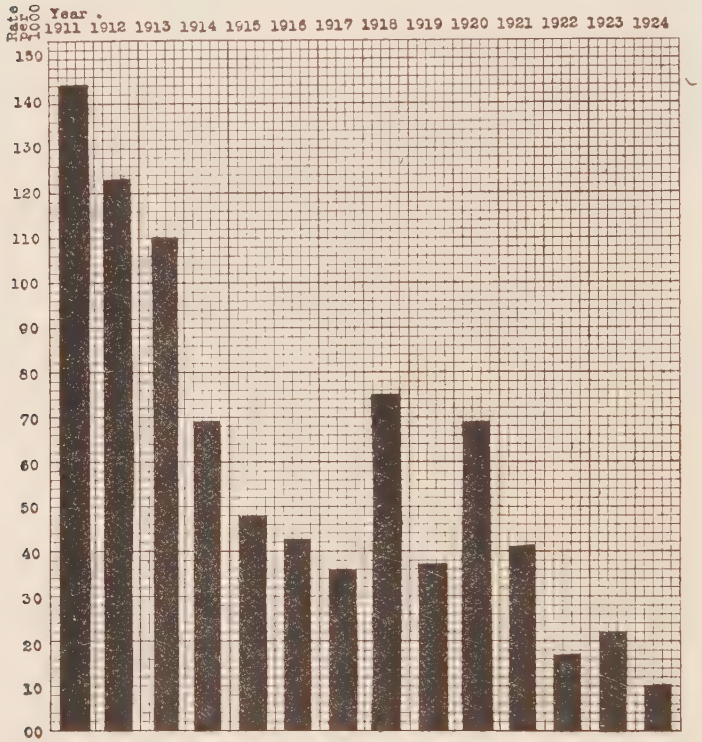
This communication is an account of the present condition as contrasted with the previous state of the Seafield Estate. Fourteen years ago the Estate was one of the most intensely malarial places in

Fig. 38.—Chart showing elimination of Malaria from Seafield Estates.



The black indicates all Malaria cases, whether treated as in- or out-patients. The scored spaces indicate in-patients only. (From 1919 no cases of malaria were treated as out-patients.)

Fig. 39.—Chart showing decline in Death Rates on Seafield Estate.



[Blocks kindly lent by the Rubber Growers' Association, and reproduced by permission of Mr. Norman W. Grieve, Chairman of the Seafield Rubber Company.]

the world ; to-day it is, if not absolutely free from the disease, certainly more free than the famous Panama Canal Zone, and as free as any part of the Malay Peninsula.

On the Estate malaria was carried by a mosquito which lived in the thousands of tiny springs and in the numerous streams of running water, and all methods hitherto applied had succeeded only in increasing the number of mosquitoes and in aggravating the severity of the disease.

The new method, that of sub-soil drainage, aimed at drying up the valleys with their springs and streams, so that no mosquito could find a breeding place. How this method has stood the test of tropical storms scouring down the narrow valleys is told in the statistics detailed.

To-day it is recorded that out of an average population of 719 for the year 1924 only 6 cases of clinical malaria occurred (parasites were found in the blood of none), and that in the years 1923 and 1924 only 1 child contracted the disease, though children are the most susceptible in the population.

The following statistical tables are of peculiar interest :—

MALARIA CASES.

Year.	Average labour force	Number admitted to hospital.	Number treated as out-patients.	Total number treated.	Per cent. of labour force treated.
1914 ...	658	815	5,370	6,185	939
1915 ...	804	900	3,235	4,137	513
1916 ...	811	933	1,558	2,491	312
1917 ...	770	719	546	1,265	162
1918 ...	639	718	315	1,063	149
1919 ...	825	614	10	624	75
1920 ...	916	1,236	—	1,236	132
1921 ...	780	609	—	609	77
1922 ...	620	369	—	369	53
1923 ...	577	56	—	56	9
1924 ...	557	6	—	6	1·08

SPLEEN RATES.

Year.	Old Seafield		New Seafield.	
	Number of children.	Percentage Rate.	Number of children.	Percentage Rate.
1905	16	68	—	—
1906	17	88	—	—
1909	11	81	36	47
1914	20	50	39	76
1915	12	83	30	60
1916	34	35	37	73
1917	32	28	36	47
1918	52	7	31	41
1920 (Jan.) ...	107	21	59	30
1921 (Feb.) ...	65	44	45	73
1922 (Feb.) ...	75	33	35	45
1923 (Jan.) ...	75	17	52	38
1923 (Dec.) ...	69	7	52	17
1925 (Jan.) ...	69	1	56	10

The anti-malarial work was begun on Old Seafield in 1911 and on New Seafield in 1914.

To-day all the children look well.

In 1923, 19 children were born, of whom 2 died.

In 1924, 23 children were born, of whom 2 died.

During 1923, 1 child contracted malaria, in 1924 not one.

No child has died of the disease for over two years.

DEATH RATE PER 1,000 OF WORKING LABOUR FORCE FROM ALL CAUSES.

Year.	Labour Force.	Death rate per 1,000.	
1911	520	144	
1912	427	123	
1913	552	110	
1914	658	69	
1915	804	48	
1916	811	43	
1917	770	36	
1918	693	75	(Influenza)
1919	825	37	
1920	916	69	
1921	780	41	
1922	670	17	
1923	577	22	
1924	557	10·7	

SENIOR-WHITE (Ronald). **The Eradication of Malaria from a Rubber Estate.**—*Indian Jl. Med. Res.* 1925. Jan. Vol. 12. No. 3. pp. 545–551. [3 refs.]

Oiling, following a survey which determined the breeding-places of *Anopheles maculatus* (this *Bulletin*, Vol. 19, p. 110), has been followed by a fall in malaria morbidity from 1,147 in 1919 to 6 in 1923. Much of the oil has been derived from the semi-solid residue which accumulates at the bottom of the tanks, where is stored the crude oil used for driving the factory engines. Direct centrifugal floatation revealed a hookworm percentage of 76·8, even after a hookworm campaign whose effect is not held to have had a share in effecting the drop in morbidity.

C. L.

WALRAVENS. **Prophylaxie de la malaria.**—*Revista Méd de Angola.* (No. especial 1ª Congresso de Med. Trop. da Africa Ocidental. Vol. 3. 3ª. 4ª. e 5ª. Sessões.) 1923. Aug. No. 4. pp. 405–411.

The work at Elizabethville (this *Bulletin*, vol. 21, p. 600) is further considered. It is felt unsound to rely upon suppression of breeding-places particularly favoured by the dangerous anopheline species, since the writer's experience has convinced him that these are readily satisfied with the next best thing. Flemish or Irish drains—ditches with a bed of branches or stones covered with earth—are advised for drainage, thus seemingly carrying out the principle of Malcolm WATSON'S subsoil drainage. Holes in trees and defective municipal guttering form further instances where lay anti-malarial leagues have helped the sanitary service. Nevertheless, mosquitoes are very numerous and the problem has not been solved. Quinine prophylaxis was accordingly pushed, 0·4 gm. being given at 6 each evening, for it is held that those who take the dose in the morning are more prone to suffer from fever. In spite of this, in children under discipline to whom, relative to weight, quinine was given in this dosage, the results were unsatisfactory, so that it was resolved to try larger doses, 1·5 gms. (3 grs.) daily for children between 10 and 15, and note the result. Continued concentration on anti-malarial work is felt to be the most promising line to pursue.

C. L.

PRATES (Manuel M.) & BARRADAS (Antonio). **Sistematisação no tratamento do sesonismo.**—*Revista Méd. de Angola.* (No. especial 1ª Congresso. de Med. Trop. da Africa Ocidental. Vol. 3. 3ª, 4ª e 5ª. Sessões.) 1923. Aug. No. 4. pp. 393–404. [1 ref.]

Pointing out that one should not have to classify towns as tropical or non-tropical, but as sanitary or insanitary, the writers imagined a typical tropical town, and attempted to estimate the cost to it of malaria, as a financial basis for the expenditure justified in its elimination. They then passed on to consider the need for a standard treatment of malaria and urged the Congress to adopt an example which they suggested. The President (Dr. LEGER) pointed out that a dose of quinine which suffices to drive *P. vivax* from the cutaneous blood is quite insufficient to effect this for *P. falciparum*.

C. L.

Marchoux (E.). **La prophylaxie pratique du paludisme.**—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. pp. 40–44.

The very multiplicity of the possible lines of attack upon malaria is held disadvantageous. It would be better could one, thoroughly applied, be made to suffice. (1) Cost renders antilarval measures of restricted applicability. (2) Destruction of adult insects necessitates squads of persons, and screening is often more effective in keeping mosquitoes in than out, while nets need proper use. (3) Preventive quinine is taken regularly almost only under discipline. (4) Detection and treatment of the actually infected is advocated as giving the quickest and best results; but a large, devoted and costly staff is required. Economic amelioration of a country by right administration is held to be its most effective antimalarial measure.

C. L.

Legendre (J.). **La prophylaxie actuelle de la malaria.**—*Presse Méd.* 1925. Feb. 4. Vol. 33. No. 10. pp. 155–156. With 4 figs.

Legendre points out the extent to which quinine prophylaxis has recently been discredited, but is yet held high by the French. He urges that this monoprophylaxis should in French colonies be more generally aided by what he calls physioprophylaxis (screening) and agroprophylaxis (antilarval measures), among the latter urging the use of edible fish in flooded rice fields. For vicarious animal protection he holds that the most attractive beast varies with the locality, between rabbit, pig, cattle and horse, the last being preferable for Madagascar.

C. L.

Couvy (A.). **Note sur un essai de prophylaxie antipaludique à Madagascar.**—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. pp. 36–40. With 1 map in text.

Two districts in the Province of Itasy show a persistent excess of deaths over births, a large part of the former being attributed directly or indirectly to malaria. The malaria indices are very high. Extensive antilarval measures added to other antimalarial work has, in and about the town of Soavinandriana, been followed by a fall of mortality from 1,192 to 759, and has attracted interest far outside its actual confines.

C. L.

Carter (H. R.). & Le Prince (J. A.). **Suggestions for the Control of Malaria on the Plantations of the United Fruit Company.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 165–168. [United Fruit Company, Boston, Mass.]

For economy, attention should be particularly directed to breeding-grounds of proved anopheline malaria carriers, those nearest to houses being first attacked. The hand killing of anopheles has proved very effective by boys of 13 to 16 years old—if they be paid by results. Two "Stickum Plates" (sheets of glass or celluloid covered on both sides with a mixture of resin and castor oil) set a few feet apart at right angles to one another will, by the number of mosquitoes which stick to each surface, indicate the direction from which these come, and point to their breeding places. The greater resistance of negroes to malaria is held to open up a wide virgin field for investigation.

C. L.

PALESTINE. **Proceedings of the Tenth Meeting of the Antimalarial Advisory Commission, 20th November, 1924.** [HERON, (G.W.), Director of Health, President.] [MS. received from Dept. of Health, Jerusalem.]

BUXTON's entomological report is appreciatively mentioned [this *Bulletin*, Vol. 21 p. 432]. The Commission has surveyed the Huleh plain including the Waters of Merom, covering 175 square kilometres and nowhere much exceeding 2 metres in depth. Those living about its bordering marshes, abundant springs and five feeding rivers have a parasite index of 50. The problem is to be dealt with by emptying the lake and turning its bed into irrigated cultivated land.

Dr. KOFE urged the administration of prophylactic quinine on the ground that small doses do no harm and tend to diminish the local number of infected anophelines.

While springs and seepage areas are satisfactorily dealt with by collection into a bifurcate drain run alternately each 5 or 6 days into 2 separate fields, the care of the wadis in the plains, with their tremendous winter washouts, is a difficult matter, and one now obtaining official investigation. Other new projects are under consideration, and the value of the work accomplished is amply demonstrated.

C. L.

LE PRINCE (J. A.). **Can we get Better Anopheles-Control and More Malaria-Control at Less Cost?**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 157–161. [United Fruit Company, Boston, Mass.]

The writer remarks that the state of malaria-control that should be obtained is not achieved, because of the failure in making the public desire it and work for that end. He points out that in the United States the public pays the screen manufacturers about 25 million dollars yearly for mosquito screen-wire, but that the protection afforded is only partial. Too many buildings that are screened are either not effectively protected or else the screening is not effectively maintained. After a building is screened, it should be inspected for places through which anophelines can enter, and any defects made good. All screened buildings should be inspected at definite, short intervals, and anything needing repair should be noted.

Even in unscreened buildings, the gorged anophelines can be easily killed with a fly-swatter when resting during the daytime. By this means nearly all the potentially-infected anophelines could be killed even in the houses of the poorest classes.

Mosquito traps as used in the Panama Zone proved effective in anopheline elimination. It is suggested that suitable, dark, tranquil, daytime resting places might be created and treated with tangle-foot compounds, so that potentially infected mosquitoes may destroy themselves in large numbers.

Trap pools, or artificial breeding-places, are advocated; these could be kept under control and treated as often as necessary.

Top minnows and other suitable fish are not used as much as they should be. Favourable mention is made of Paris green as a larvicide.

In carrying out anti-malarial work the non-essentials should be avoided, but effort should be concentrated on all proved and recognized methods against the anopheline.

Kligler (I. J.) & Shapiro (J. M.). **Organisation of Areas for Mosquito Control in Palestine.**—*Harefuah.* Jerusalem. 1925. Apr. Vol. 1. No. 4–5. English summary pp. v-vi. [In Yiddish pp. 180–188. With 35 charts and tables on 2 folding sheets.] [5 refs.]

Nine districts were dealt with in various parts of the country, comprising a population of 13,580 Jews and 7,650 Arabs. Greatest emphasis was laid on anti-mosquito work, treatment of carriers being a subsidiary measure. Quinine prophylaxis was not used.

In reservoirs in the orange groves the fish Petach Tikwah (Tilapia) was used with great success. Erosion pools in wadis were cleaned and oiled. Springs were dammed and the water released at intervals. Irrigation and mill channels were closed for 24-28 hours, until they and the swamps caused by them were dry.

The following were the most useful larvicides: Kerosene mixed with crude oil in the proportion of 9 to 1 to which 1-2 per cent. castor oil was added; this was used when the air was calm. Paris green was found excellent in overgrown swamps or wadis. Cresol (1-10,000 as the final concentration) was useful in gravel swamps and pools.

Benign tertian predominates during the spring and summer, malignant tertian almost exclusively only during September to December, the peak being in October. The only districts in which no progress was made was in the areas of coastal marshes, which are difficult to control. The *per capita* cost worked out at as low or lower than that of similar operations in the United States of America.

i. Bernard (Léon) & Marchoux. **La lutte contre le paludisme et l'organisation sanitaire en Italie.**—*Bull. Acad. Méd.* 1924. Dec. 16. Year 88. 3rd Ser. Vol. 92. No. 42. pp. 1453–1461, and *Rev. d'Hygiène.* 1925. Feb. Vol. 47. No. 2. pp. 101–108.

ii. Raynaud (Lucien). **La malaria en Italie: lutte antipaludique; ses procédés; ses résultats.**—*Presse Méd.* 1924. Nov. 19. Vol. 32. No. 93. (Supplément) pp. 1951–1953.

i. Regarding the Inquiry by the League of Nations (this *Bulletin*, Vol. 22, p. 39), it is here noted that the sale of State quinine has, since 1902, resulted in a profit of 24 million lira, of which 17 millions have been spent on antimalarial measures.

ii. The results of scientific control of antimalarial work in Italy lead to the urgent recommendation that similar co-ordination is essential for Corsica.

C. L.

Bote (George S.). **Drainage Ditches covered economically. Concrete Pipe manufactured and laid cheaply in Emporia, Va.**—*Public Health Rep.* 1925. Mar. 13. Vol. 40. No. 11. pp. 502–509. With 3 figs on 1 plate.

Approximately nine miles of open ditching have been completed and placed under mosquito control. In that part of Virginia in question the top soil is loam and the next lower stratum is gravel or blue clay. The banks of the ditches have gradually caved in and the bottoms have widened. The maintenance cost of the ditches has

progressively increased, in some places fences on property lines have fallen, and the oil-soaked mud thrown out in the cleaning processes resulted in unsightly accumulations.

For several years attempts have been made to find an inexpensive method of piping or covering the ditches, but it was not until 1924 that a practical and economical plan was evolved.

A 30-inch pipe was needed for the ditches that it was proposed to cover first, and it was found that if terra-cotta piping was purchased

MAKING CONCRETE PIPES IN EMPORIA, VA., FOR DRAINAGE DITCHES.

FIG. 40.—Filling metal moulds with concrete. Each mould has one inside casing, one outside casing, one cone centering plate, one top socket ring and one bottom socket ring. If an extra bottom socket ring for each mould is provided, a mould filled with concrete one day can be removed and refilled on the following day without moving or handling the pipe poured the first day.

FIG. 41.—Concrete pipes ready to be laid.

Fig. 42.—Pipe in ditch.
[Reproduced from the *Public Health Reports*, Washington.]

the cost of provision and laying would amount to 4·57 dollars per foot. Such expense could not be supported, and other expedients were examined. The plan finally decided upon was to purchase metal moulds and to make the piping of concrete locally. The necessary mouldings for the making of 30 in. pipes were obtained at a cost of 56 dollars per section, that for a 24-in. pipe amounting to 42 dollars.

The metal moulds were set on a concrete platform about 6 ft. square ; it is important to have them set level in order to get smooth and even ends to the piping, so that jointing may be satisfactory. The concrete was mixed by hand and consisted of 1 part Portland cement, $1\frac{1}{2}$ parts sand and $2\frac{1}{2}$ parts gravel or crushed stone. Gravel should not exceed $\frac{1}{2}$ inch in size. Each pipe is reinforced with 6 rings of No. 9 wire, the rings being placed as the moulds are filled and spaced as equally as possible.

As compared with the price detailed above for 30-in. piping purchased in the ordinary market, the cost per foot of the locally manufactured piping was reduced to 73 cents per foot or less.

The writer concludes that the advantages are as follows :—

" (1) Small outlay for equipment.

" (2) Pipe can be made at odd times, as much or as little as funds will permit.

" (3) Practically no overhead when moulds are not in use.

" (4) Low cost of manufacture, with resulting greater accomplishment in proportion to expenditure.

" (5) Equipment always on hand to manufacture pipe when needed."

The method is stated to have worked exceedingly well.

Public Health Reports. 1925. Jan. 30. Vol. 40. No. 5. p. 215. **—Mosquito Breeding in Water Barrels. Instructive Incident in Campaign against Mosquitoes at a Naval Operating Base.**

Owing to negligence in oiling two barrels of water kept for fire purposes thousands of Culex mosquitoes were bred out and distributed

over the naval base. Every available body of water was stocked by the insects, and owing to frequent rain many breeding places existed. Although nearly four tons of nitre cake and 150 gallons of crude oil were used during September, 1924, thousands of mosquitoes still remained. No anophelines were found.

GREEN (Howard Whipple). **The Theory of the Use of Oil for Destroying Mosquito Larvae.**—*Amer. Jl. Public Health.* 1925. Mar. Vol. 15. No. 3. pp. 219–222. [1 ref.]

The results of experiments undertaken in 1921 and 1922 to determine what properties of oils were active in killing mosquito larvae may be outlined as follows (full-grown *A. albimanus* larvae were used in all the experiments unless otherwise stated) :—

I. The oil film causes full-grown anopheles larvae to die :

(*a*) By suffocation due to a mechanical barrier being formed between them and the air. Larvae live the same length of time (22 minutes) when prevented from reaching the outside air by physical means as by a film of non-toxic oil such as Nujol.

(*b*) By suffocation due to the oil entering their breathing siphons to an extent sufficient to physically block the passage of air. Larvae die in the same length of time after being exposed to a film of Nujol for 53 seconds as when exposed for 22 minutes. The heavy oils do not enter the siphon to any extent and therefore a short exposure has no effect upon the larvae.

(*c*) By poisoning due to the toxic properties of the volatile portions of the oil penetrating the tracheal tissues. Gasoline causes death in 12 seconds, kerosene in 4 minutes. The volatile portion of the oil alone causes death in the case of gasoline in 7 minutes, and kerosene in 2 hours.

II. The rapidity with which the larvae die is dependent upon the volatility and toxicity of the oil.

Larvae obtaining large quantities of this toxic substance die in much shorter time than those obtaining small quantities.

III. Larvae obtain their fatal dose in a very short time.

(*a*) Larvae obtain their fatal dose of gasoline in less than one second, and of engine distillate (Texaco) in less than two seconds.

(*b*) Larvae do not obtain a fatal dose of oils so heavy that they do not enter their breathing siphons.

IV. Culex larvae require at least 6 to 8 times as long to die as do Anopheline larvae.

The method used to apply the oil is nearly as important as the oil itself.

One method is to cover the surface of a body of standing water with a large quantity of heavy non-toxic oil which, provided the entire surface is continuously covered, will after several hours kill all the larvae. It will also prevent egg laying and will kill any female mosquito attempting to oviposit. A large quantity of oil of good spreading power and slow evaporation is necessary. This method is not suitable for running water or for waters exposed to much wind action.

A preferable method is to cover the entire surface with a very thin film of a toxic oil which will kill the larvae rapidly and may then evaporate completely. Eggs will be deposited again on the water surface, and

it is necessary to oil a short time before the new-brood is ready to hatch out. Owing to differences in surface tension, oil placed in the centre of a water surface does not cover completely, the film does not reach the banks or flow into pockets at the sides of streams. In order to overcome this difficulty instructions are issued to " paint " both sides of all ditches with oil. Applied in this way the edges are treated and, moreover, the oil will spread to the centre in addition.

The oil is best applied by spray cans, of which there are two general types : The Myers knapsack spray pump, Panama type, fitted with a Bordeaux nozzle, and the Pneumatic Compressed Air Sprayer. The disadvantages of the knapsack sprayer are considered to be :—

1. The capacity of 5 gallons of oil makes a heavy load.
2. Being carried on the back renders it difficult to manage in rough country where climbing fences and mounting other obstacles is necessary.
3. Spillage of oil is liable to occur on to the back of the oiler. This results in damage to clothing and sometimes in injury to the skin.
4. Owing to the weight there is a tendency for the oiler to use more oil than is necessary in the first part of his trip, in order to lighten the burden.

Otherwise, this sprayer is well-constructed, easily cleaned and capable of standing hard usage.

Several types of Pneumatic Compressed Air Spray tanks and nozzles were tested. It was found that the Myers Compressed Air Spray tank, fitted with a 2½ ft. extension and a graduating vermorel nozzle, gave the best satisfaction and was most economical. The capacity of the tank is three gallons, and it is carried in the hand or suspended from one shoulder. The oil cannot be spilled, and is put under pressure by manipulating a pump handle, which operation must be repeated frequently. The oil is released only when the hand firmly grasps the spring valve. The extension piece allows of the oil being placed exactly where required regardless of the velocity of the wind. Without the extension piece, or with a short extension, much of the highly volatile and toxic portion of the oil never reaches the water surface in the ditch. With a suitable extension piece the portion of oil most active in killing the larvae reaches the water surface and is not blown away, as so frequently happens when the spray passes through the air for a number of feet.

CURRY (Dalferes P.). **Some Observations on Mosquito Control in the Canal Zone, with Especial Reference to the Genus Anopheles.**— *Amer. Jl. Trop. Med.* 1925. Jan. Vol. 5. No. 1. pp. 1–16. [10 refs.]

The diseases known to be commonly carried by mosquitoes are yellow fever, dengue, filariasis and malaria.

The first of these, it is believed, need no longer be dreaded ; yellow fever is not known to be prevalent in any country with which the Canal has contact sufficiently intimate to favour its importation. It is not stated that the Canal Zone is entirely free of *Aëdes aegypti*, but CONNOR and HANSON, as well as others, have conclusively shown that it is not necessary to aim at absolute extermination of the last *aegypti* in order to break the chain of infection. Owing to the piped water supply of the Canal Zone and the adjacent cities of Panama and

Colon there should never occur, even without the watchfulness now maintained, an *Aëdes aegypti* population sufficient to render the community infectible to yellow fever.

Dengue, also conveyed by *A. aegypti* and *Culex quinquefasciatus*, does not appear to thrive on the Canal Zone, or else its spread is limited by the same factors that limit yellow fever.

Filariasis is not a disease of much concern. Though present amongst the Porto Rican soldiers stationed on the Isthmus, it is apparently not as easily contracted as some of the other mosquito-borne diseases and there is no experience of its spread in the Zone. It is said to be conveyed by *C. quinquefasciatus*, and possibly by *A. albimanus*, as well as by other mosquitoes which do not occur in the Zone.

The control of malaria is quite another question. The following table shows the admission rate per 1,000 employees for the years specified :—

Year.	Average number of employees.	Rate.	Year.	Average number of employees.	Rate.
1904 ...	6,213	125	1914 ...	44,329	82
1905 ...	16,511	514	1915 ...	34,785	51
1906 ...	26,547	821	1916 ...	33,176	16
1907 ...	39,238	424	1917 ...	32,589	14
1908 ...	43,890	282	1918 ...	25,520	18
1909 ...	47,167	215	1919 ...	24,204	31
1910 ...	50,802	187	1920 ...	20,673	19
1911 ...	48,876	184	1921 ...	14,389	15
1912 ...	50,893	110	1922 ...	10,447	17
1913 ...	56,654	76	1923 ...	10,976	19

General Gorgas, writing in 1909, says :—

" Our antimalarial measures consist :—

" 1. In destroying the habitat of the anopheles during the larval stage within a hundred yards of dwellings.

" 2. Destroying within the same area all protection for the adult mosquito.

" 3. Screening all habitations so that the mosquito cannot have access.

" 4. Where breeding places cannot be done away with by draining, use is made of crude oil, Phinotas oil and sulphate of copper for the destruction of larvae."

The above was done at a cost of " only five hundred thousand on purely sanitation," *i.e.*, exclusive of the cost of the care of lepers, of the insane, of street cleaning, garbage collecting, etc.

In comparison the activities of the work to-day are :—

1. Destroying the *anopheles* (*and all other mosquitoes*) during the larval stage within *one mile* of the more important residential and industrial centres; large breeding areas of anopheles of the more dangerous species are controlled by ditching up to the distance of two miles, if the necessity for so doing is indicated.

2. Practically no attention is paid to " harbouring places " that afford protection to adult mosquitoes; the money is spent on the control of breeding.

3. Screening of habitations is insisted upon with the same thoroughness as in previous years. In some of the smaller and less important places where no anti-larval work is done, screens are the only means employed against mosquitoes.

4. Larvicides of various kinds have been employed from time to time, but now only crude petroleum of high viscosity (the fuel oil of local commerce) is used, with results that are satisfactory from the point of economy and efficiency. Breeding-places have been done away with by open ditching, subsoil rock and tile drains, and by filling, so that gallons of oil suffice where formerly barrels were required. Improved methods of applying oil have achieved much of this saving.

The above have been carried out at a cost of 60,000 dollars a year for the past two years.

It must be stated, however, that, geographically, the present-day situation is very different to that of the first 10 years of American sanitation. In the latter period much engineering work was going on which necessarily destroyed anti-malarial work possibly just completed, and, moreover, created fresh troubles for the sanitarian. Nowadays, there are considerable areas in which anti-malarial measures are no longer required ; much of the ground formerly under control has been inundated by the formation of Gatun Lake ; employees have been grouped in fewer places ; and the Army maintains its own sanitary supervision about the posts outside the terminal cities.

It is only during the past few years that recognition of the long flight of *A. albimanus* has necessitated the extension of anti-malaria work to a distance of at least two miles from protected centres. It is probable that operations will be yet further extended in some of the more prolific breeding areas on the Atlantic side of the Isthmus.

Of the 11 species of Aëdes present only two are common or troublesome. *A. aegypti* breeds only within or very near to human habitations in artificial containers. *A. taeniorhynchus* is a fiercely biting, striped, black mosquito which invades the Zone from tidal swamps at a distance said even to exceed 40 miles away ; its presence in large numbers is usually of but brief duration in the early weeks of the rainy season.

Of the 39 species of Culex, only one is commonly troublesome to man—*C. quinquefasciatus*, the fairly large, banded, brown mosquito with breeding habits somewhat similar to *A. aegypti*, except that it has a wider choice of breeding-places and prefers waters that are foul, as in cess-pools, sewers and gutters.

Of the four Mansonia present, one at least is a long-flying and bloodthirsty pest, but its breeding range is limited to the quiet water of lakes and rivers where *Pistia* (water cabbage) flourishes.

The Anopheles are naturally the most important genus for consideration. Dr. Dyar lists nine of these : *Anopheles albimanus* Wied., *A. tarsimaculata* Goeldi (Mr. Zetek considers this only a variety of *albimanus*), *A. argyritarsis* Rob.-Des., *A. neivai* H. D. and K., *A. punctimacula* D. and K., *A. apicimacula* D. and K., *A. eiseni* Coq., *A. pseudopunctipennis*, Theob., and *A. nimba* Theob. Mr. Zetek reports another, *A. hylephilus* D. and K., which Dr. Dyar does not now include or mention in the synonymy of his species.

All the authorities are in agreement that the *albimanus-tarsimaculata* group is greatest in importance. They fly farther, more persistently seek entrance to houses to feed on human blood, and have a higher rate of infectibility with plasmodia than any of the others. While they have a fairly general distribution of breeding-places in the wet season, it has been recently observed by the author that they are practically the only anopheles which breed to any great degree in the brackish, partly tidal swamps of the Atlantic side of the Isthmus, which

are covered with vegetation and are shallow. The creation of Gatun and Miraflores lakes, the first of 165 sq. miles, and the other of 3 sq. miles, has greatly increased the areas most favourable for *albimanus* breeding, and these lie within the economically imposed limit of two miles from important industrial and residential centres.

A. pseudopunctipennis is also common and widely distributed, but is limited in breeding to the smaller streams and ditches and isolated pools, usually where sunlight has free access and algae are plentiful. This species does not fly so far as the preceding group, and does not so commonly invade habitations. DARLING found it to be far less capable of infection with malaria than *albimanus*. The species, while possibly of importance when breeding close to habitations, need not be considered a menace when breeding at a distance, and it is considered that half-a-mile, or even less, could be safely the limit of effort at control.

A. argyritarsis may also be experimentally infected with malaria, but it closely shares the characteristics of *pseudopunctipennis* as a menace. It is not considered a grave factor in the malaria incidence in the Canal Zone.

A. punctimacula and *A. apicimacula* are so similar in habits and characteristics that they may be considered as one from the sanitary point of view. They usually breed in sheltered or grassy pools of clear clean water and do not generally invade houses or fly great distances. It is probably safe to ignore both of these species as factors in malaria production.

A. eiseni has, as breeding places, the scant water held between the sheaths and leaves of plants, and clear clean water in rock pools, especially if under shade. Nothing is known of its malaria-carrying powers.

A. neivai, *A. nimba*, and *A. hylephilus* breed only in the water held by certain plants and are extremely rare.

The opinion is expressed that *A. albimanus* and the variety *tarsimaculata* alone merit extensive and expensive anti-malarial work in the Canal Zone. Were this species not present, the malaria problem would probably dwindle to insignificant proportions.

BOYD (J. E. M.). **Some Further Notes on Cresol as a Larvicide.**— *Jl. Roy. Army Med. Corps.* 1925. Apr. Vol. 44. No. 4. pp. 285–287.

As a result of trials of Cresol as a larvicide at several stations in India, the opinion is expressed that no solution of less strength than 1 in 100,000 will prove of use.

PUBLIC HEALTH REPORTS. 1925. Jan. 9. Vol. 40. No. 2. pp. 51–54. **The Present Pandemic of Plague.**

The present pandemic of plague began in China in 1894. In 1896 India, Japan, Asiatic Turkey, and European Russia were infected. In 1898 the disease spread to Madagascar and Mauritius, and in 1899 it appeared in Arabia, Persia, the Straits Settlements, Austria, Portugal, British South Africa, Egypt, the French Ivory Coast, and Portuguese Africa. About the same time plague appeared in Argentina, Brazil, Paraguay, and the Hawaiian Islands, and in 1900 the disease appeared for the first time in the United States, in California, at San Francisco. In addition to its having appeared in other South American countries since 1900, the disease reached Seattle in 1907, in 1914 it appeared in New Orleans, in 1920 in Beaumont and Galveston, Tex.

During the calendar year 1923 plague was reported as being present in the following countries: Algeria, Australia, Azores, Brazil, British East Africa, Canary Islands, Ceylon, Chili, China, Ecuador, Egypt, France, Greece, Hawaii, India, Indo-China, Iraq, Japan, Java, Madagascar, Mauritius, Mexico, Morocco, Palestine, Peru, Portugal, Portuguese West Africa, Russia, Siam, Siberia, Spain, Straits Settlements, Syria, Tunis, Turkey, Union of South Africa, and Venezuela.

Some of these countries have been plague-infected for many years and no doubt will remain so for many years to come.

Mitchell (J. Alexander). **Plague. Its Control, Eradication, and Prevention.**—*Med. Jl. S. Africa.* 1925. Mar. Vol. 20. No. 8. pp. 235–238. (Annexures A, B, and C. pp. 238–240.)

This is a valuable memorandum primarily intended for the information and guidance of Local Authorities, District Surgeons and Medical Officers of Health of rural areas; much of it, however, is applicable to urban areas.

The memorandum is somewhat long to give in detail here. It will without doubt repay perusal by all concerned with the prevention of plague. For the purpose of the *Bulletin* it will suffice to mention the various headings under which information and instruction is detailed.

In the note on equipment stress is laid on the necessity of being prepared for emergencies. Local authorities should provide in advance such equipment as will enable a few cases of the disease, or of suspects, to be isolated, and the necessary disinfections to be carried out.

The need for accurate diagnosis is next emphasized and attention is directed to pamphlets issued by the Health Department of the Union with that object. The prevalence of rodents in dwellings, out-buildings, or on the veldt, and any evidence of suspicious sickness or mortality amongst them, is mentioned.

The taking of specimens and materials is next dealt with. Full directions are given as to containers, methods for the proper collection of specimens from: (1) Suspected cases with inflamed glandular swellings, not discharging; (2) suspected pneumonic or "Bubo-pneumonic" cases; (3) suspected septicaemic cases. Details are given as regards the taking of material at post-mortem examinations.

The labelling, packing and forwarding of specimens are fully dealt with, and the precautions necessary when making post-mortem examinations are mentioned.

Clear instructions are given as regards the reporting of plague cases and of outbreaks, and the measures for dealing with the latter are comprehensive and definite.

Remarks follow as to plague amongst rodents, and preventive methods for towns, dwellings, and for rural areas, are detailed.

In the conclusion of the memorandum the risks of conveyance of infection by rail, etc., are brought to notice.

The three annexures are as follows:—

Annexure A contains an abstract of regulations under the Public Health Act concerning Plague. Particulars are given regarding: (1) The reporting of deaths or illness, or rodent mortality; (2) isolation, quarantining and disinfection; (3) preventive measures; (4) rodent-proofing of buildings in urban areas; (5) storage of grain, forage, etc., on farms and in towns.

Annexure B deals with liquid disinfectants and insecticides, and provides information as to their use in connection with plague. Details of the following are given: Naphthalene oil, perchloride of mercury, formalin, the coal tar derivatives, and solution of chloride of lime.

Annexure C provides information on fumigation and gassing methods (for rodents and fleas) in connection with plague. Details on the use of the following are supplied: Capex mole and vermin destroyer cartridges, agricultural dynamite, carbon bisulphide, hydrocyanic acid, formalin gas, and sulphuric acid gas.

The memorandum and the annexures form a most useful and helpful guide to the prevention of plague, and without doubt are a valuable assistance to those engaged in this matter.

WHITE (Charles F.). **Rat-Guards for Ships' Hawsers.**—*Lancet.* 1925. Mar. 28. pp. 695–696. With 1 text fig.

A new design of rat-guard is described, for which the following advantages are claimed:—

(1) *Ease of Application.*—The guard is easily and rapidly applied to one, two, or three ropes, and needs no binding in position.

(2) *Maintenance of Position.*—Under trying circumstances of wind and alternate tightening and slackening of ropes the guard has maintained its position vertical to the rope for a week's test without any adjustment whatever.

(3) *Rigidity.*—Except for the door opening, the guard is one continuous sheet of metal, and is therefore very much stronger than the old type. The riveting of the collar to the disc adds greatly to the stability of the guard, while the steel spring resists the bursting strain when two or three ropes alternately slacken and tighten with the movement of the ship.

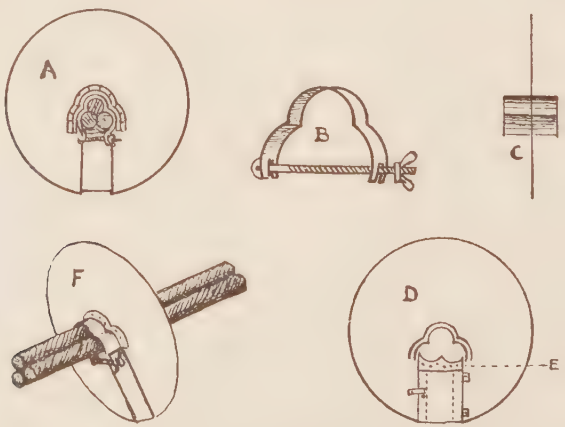


FIG. 43.—A. Front view of rat-guard showing three ropes clamped by steel spring. Outside the spring is the collar and below the door, shut and providing no foothold for rats. B. Steel spring for three-rope guard with screw clamp. C. Side view of guard showing projection of collar on each side. D. Reverse side of disc showing hinges and fastening of door. E. Sheet rubber fitting on top of door. F. Guard fixed on mooring-ropes.
[Reproduced by permission from the *Lancet.*]

The guard consists of a disc of galvanised sheet iron $\frac{1}{16}$ inch thick and 3 ft. in diameter. The edges are left raw, *i.e.*, not wired or turned over. In the lower half is cut a door, hinged and so fastened when shut that no foothold is afforded to rats. The door slit leads to the central hole through which the rope passes. Round the central hole is placed a strong collar projecting about 4 in. on each side, and riveted to the disc. In the collar is a strong steel spring clip which can be tightened by the winged nut on the bolt (fig. *b*). In application the door is opened and the guard put over the rope so that the latter passes up into the central hole, where a little force is necessary to overcome the spring of the clip, The guard will now hold quite firmly, but the bolt and screw closing the opening of the clip gives additional security. The door is then closed and fastened, the upper edge having a piece of thick sheet-rubber attached so as to close completely the central hole, whatever the size of the rope in use. In the sketch a type of guard suitable for three ropes is shown, such being frequently necessary for large ships. Types are also made for two ropes, one rope or two or three wires, and any guard will fit ropes over a range of about 3 in. difference in diameter, so that any ship may easily be supplied with a set of guards suitable to her requirements.

The guards cost a few shillings more than the usual pattern, but this should be repaid in longer life and greater efficiency. Messrs. Fred. Moore and Company, 46–48, Park Lane, Liverpool, are the manufacturers.

Public Health Reports. 1925. Mar. 6. Vol. 40. No. 10. pp. 451–455. With 4 figs. on 2 plates.—**Rat-Extermination Measures employed at Liverpool, England.**

The information is taken from a recent report on the subject made by the American consul at Liverpool.

The following is given as the personnel engaged :—

For the City.	*For the Port.*
1 assistant officer of public health.	1 assistant officer of public health.
1 chief inspector.	1 chief inspector.
1 departmental chief inspector.	1 departmental chief inspector.
33 inspectors.	5 qualified sanitary inspectors.
8 rat catchers.	7 rat catchers.
	3 rat searchers.

For rat-suppressive measures the City is divided into three zones :—

Zone 1.—Ships in port.
Zone 2.—(*a*) Docks.
(*b*) Neighbouring warehouse districts.
Zone 3.—Remainder of the City.

Zones 1 and 2 are dealt with by the port sanitary authorities, and Zone 3 comes under the City sanitary authorities. The two bodies are entirely separate units and are responsible to the Medical Officer of Health.

The City.—This is divided into 30 districts each in the charge of an inspector. Three inspectors are used for special and relief work.

The operations of the rat-catchers are governed by the reports of the inspectors; they are not assigned to any particular district, but are utilized where most required.

The Port.—The objects constantly in view are :—

(1) Early detection of plague-infected rats.
(2) Prevention of spread of infection when found.
(3) Reduction in the number of rats on ships and wharves, from the point of view of both plague-prevention and for economic reasons.

All rats caught are examined bacteriologically to detect plague infection.

In addition to their ordinary work of general port sanitation the inspectors obtain particulars as to rat infestation of all ships entering port, and whether any sick or dead rats were reported during the voyage.

The rat searchers devote their time to the searching of ships and wharves for sick or dead rats and for indications as to whether fumigation is necessary. Special attention is paid to arrivals from infected ports. When not engaged on ships the searchers work systematically over the dock areas.

Of the 7 rat-catchers, 3 are employed on ships, and 4 on the wharves; their work is guided by reports of the sanitary inspectors and rat searchers. Concentration on any suspected area is arranged and extensive rat-extermination instituted when indicated. All rats caught and all sick or dead rats found are examined bacteriologically; accurate records are kept so that the locality from which any particular rats have come can be immediately determined.

The methods of rat-destruction generally employed are, trapping, poisoning and fumigation. Poisoning is not employed to a great extent, as it is considered a rule to regard with suspicion all rats found dead, until the absence of plague infection is proved. Circular metal rat-guards, 3 ft. in diameter, are used on mooring ropes of vessels; some difficulty has been experienced in keeping these in position. One steamship line employs a man whose whole time is occupied in keeping the guards of their ships properly adjusted.

Fumigation of ships is carried out as follows :—

(*a*) On suspicion of plague infection among the rats on board.
(*b*) To comply with the requirements of certain foreign governments who demand a certificate of fumigation.
(*c*) When investigation by rat searchers and rat-catchers indicate that the vessel is infested.

Sulphur dioxide gas is used, being generated in iron pots standing in water. Cylinders of liquid SO_2 are used in oil-burning vessels.

If plague-infected rats are found upon a vessel entering port; the following precautions are immediately taken :—

The vessel is breasted 6ft. from the wharf. Rat guards are placed on mooring ropes. The gang-way is whitewashed and hoisted when the vessel is not working: when in use a guard is stationed at each end. Concentration of the entire staff may be made in the search of the vessel and its cargo for rats, additional labour is engaged if necessary. Information concerning the crew is obtained and any members absent owing to sickness are visited. Local disinfection of different parts of the ship is carried on while unloading. Complete and simultaneous fumigation of the whole vessel is done after it has been unloaded. Workers on the ship and wharf are kept under observation for 7 days after fumigation of the vessel.

Rat-proofing, especially of buildings used for foodstuffs, is carried out. The illustration reproduced shows two methods which are

FIG. 44.—Raised-building method of rat-proofing sheds on the wharves in Liverpool. Huts and offices are raised 18 inches to 2 feet above ground level, and the space beneath is kept clear of refuse.

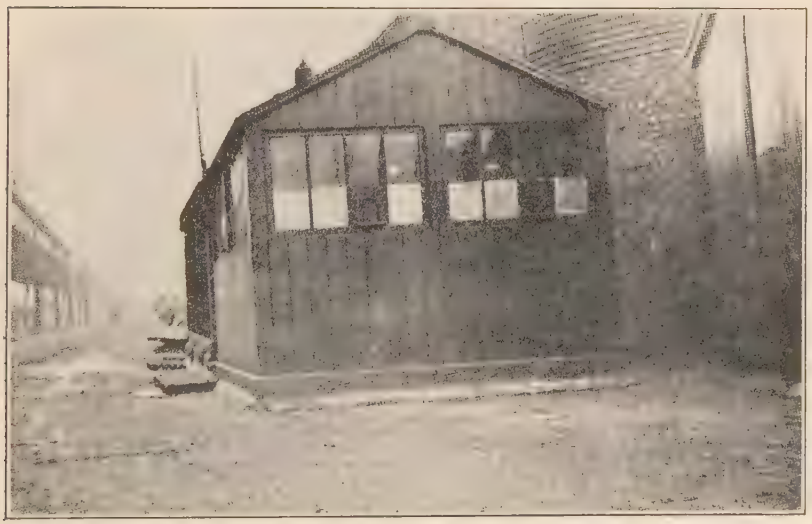


FIG. 45.—Method of rat-proofing shacks on the wharves in Liverpool by means of concrete curbing.
[Reproduced from *Public Health Reports*, Washington.]

employed. Huts and offices are raised 18 inches or 2 feet above the ground level, and the space beneath is kept clear of refuse. Concrete curbing is also made use of for the purpose.

Romby (Paolo). [**Note sur les résultats obtenus par la vaccination anticholérique sur les troupes de la 3e armée italienne.**]—[Summarized in *Arch. Med. et Pharm. Milit.* 1924. Dec. Vol. 81. No. 6. p. 850 and *Bull. Office Internat. d'Hyg. Publique.* 1925. Apr. Vol. 17. No. 4. p. 389.]

Anti-cholera inoculation carried out in the 3rd Italian Army during the cholera epidemic of 1915–16 is considered to have rendered invaluable service in limiting the spread of the disease amongst the troops and in favourably influencing cases which arose. Inoculation is especially indicated when the conditions of time and locality preclude the ordinary measures of prophylaxis, such as occur in zones where the troops are under fire from the enemy, or when units are subject to frequent and unforeseen changes of station. Under these circumstances inoculation presents a unique security in the campaign against cholera.

The operation can be conducted with speed and it confers a high degree of immunity, which, however, is of short duration, not extending beyond four months. Inoculation has no ill effects upon carriers of the vibrio. The majority of germ-carriers were found in vaccinated individuals.

WATER.

Ross (W. C.) & Bagchi (K. N.). **The Seasonal Variation in the Reaction and Hardness of River Water in India. Part II.**—*Indian Jl. Med. Res.* 1925. Jan. Vol. 12. No. 3. pp. 457–462. With 2 charts in text.

The investigation was begun in 1917 with a view to determining the relationship between the reaction of river waters and the use of alum preparations in their sedimentation.

In the first paper on the subject it was shown that there is a seasonal change in the reaction of river waters characterised by alkalinity for 6 to 8 months between October and May and acidity for 4 to 6 months between May and October. The alkalinity is due to the normal presence of carbonates of lime (chiefly) and of magnesia in the water, and the acidity is caused by the presence of free carbonic acid gas, which increases in quantity during the period of acidity, whilst at the same time the temporary hardness diminishes to a corresponding extent.

A series of experiments were first made to determine any change in the total quantity of calcium in the water, and also to show if any other salt of calcium took the place of the calcium carbonate (temporary hardness) which had disappeared. The total calcium was found to vary very little, and calcium nitrate was shown to replace the calcium bicarbonate to an extent that varied more or less directly with the acidity of the water.

Search for the source of nitric acid resulted in the discovery that the proportion of free nitric acid in rain was exceptionally high. The presence of free nitric acid in rain has been observed in many countries, but most observers have reported very small quantities. It seems that the atmospheric conditions in India are unusually favourable to

the production of nitric acid in the atmosphere, and it was found that in 1921, at Patna College, with a rainfall of 42·15 inches, there was a production of 8·76 pounds of nitric acid per acre, or 2·52 tons of nitric acid per square mile.

In these observations there is a complete explanation of the seasonal variation in the reaction of river waters, and also possibly a partial explanation of the continued fertility of the Gangetic plain, in spite of its continuous cultivation for centuries without any adequate quantity of manure being added to the soil.

Public Health Reports. 1925. Apr. 10. Vol. 40. No. 15. pp. 693–722. With 6 charts in text. [10 refs.]—**Report of Advisory Committee on Official Water Standards.**

A committee composed of representatives from Government departments and scientific associations and of eminent sanitarians was appointed by the Surgeon-General in May, 1922, to review the Treasury Department standard for drinking water on interstate common carriers, and to recommend a standard or standards, based on specific methods of laboratory analysis and field surveys, to be applicable to all classes of drinking water supplies coming within the jurisdiction of the interstate quarantine regulations of the United States.

Proposed Standards.

The requirements recommended are as follows :—

I. As to Source and Protection.

(1) The water supply shall be :—
  (*a*) Obtained from a source free from pollution ; or
  (*b*) Obtained from a source adequately protected by natural agencies from the effects of pollution ; or
  (*c*) Adequately protected by artificial treatment.

(2) The water supply system, including reservoirs, pipe lines, wells, pumping equipment, purification works, distributing reservoirs, mains and service pipes, shall be free from sanitary defects.

Note 1. *Natural agencies*, affording more or less complete protection against the effects of pollution are, in surface waters : dilution, storage, sedimentation, effects of sunlight and the associated biological processes tending to natural purification ; and in the case of ground waters, percolation through the soil.

Note 2. *Adequate protection* by artificial treatment implies that the method of treatment is appropriate to the source of supply ; that the works are of sufficient capacity, well constructed, skilfully and carefully operated. The evidence that the protection thus afforded is adequate must be furnished by frequent bacteriological analysis and other appropriate examinations.

Note 3. *Sanitary defect* means faulty condition, whether of location, design, or construction of works, which may regularly or occasionally cause the water supply to be polluted from an extraneous source, or fail to be satisfactorily purified.

II. As to Bacteriological Quality.

(1) Of all the standard (10 c.c.) *portions* examined in accordance with the procedure specified below, not more than 10 per cent. shall show the presence of *B. coli* group.

(2) Occasionally three or more of the five equal (10 c.c.) *portions* constituting a single standard *sample* may show the presence of *B. coli*. This shall not be allowable if it occurs in more than :—

(*a*) Five per cent. of the standard samples when twenty (20) or more samples have been examined.

(*b*) One standard sample when less than twenty (20) samples have been examined.

NOTE.—It is to be understood that in the examination of any water supply the series of samples must conform to *both the above requirements*, (1) and (2).

Definition—

The B. coli group is defined, for the purpose of this test, as in* Standard Methods of Water Analysis, American Public Health Association, New York, 1923.

The standard portion of water for this test shall consist of 10 cubic centimetres (10 c.c.).

The Standard sample for this test shall consist of five (5) standard *portions* of ten cubic centimetres (10 c.c.) each.

III. As to Physical and Chemical Characteristics.

The water should be clear, colourless, odourless, and pleasant to the taste, and should not contain an excessive amount of soluble mineral substances nor any chemicals employed in treatment.

Under ordinary circumstances simple evidence that the water is generally acceptable in appearance, odour, and taste will be considered sufficient ; detailed analysis will only be required when there is some presumption of unfitness by reason of physical or chemical characteristics.

There are three Appendices to the Recommendations in regard to which short references may be made.

Appendix I.

Scope of requisite information as to source and protection.

1. A sanitary survey of the water supply should be made by a competent person.

2. A brief general description of the water supply should be submitted.

3. A brief summary of the pertinent facts relating to the sanitary condition of the water supply, as revealed by the field survey, should be submitted.

4. The agent who makes the sanitary survey should submit his personal opinion as to the sanitary character of the supply based on his field survey.

The scope of the survey is indicated, the necessary information required to form an adequate opinion on a water supply being detailed. Examples of sanitary defects are given under each class of water mentioned. The following are detailed : (*a*) Small ground water supplies ; (*b*) large ground water supplies ; (*c*) surface water supplies, unfiltered ; (*d*) surface water supplies, filtered ; (*e*) pumping station ; (*f*) distribution system.

* The definition is as follows : "as including all nonspore-forming bacilli which ferment lactose with gas formation and grow aerobically on standard solid media."

Appendix II.

The Bacteriological Standard.

The examinations that have come to be generally recognized as of most value are :—

1. The count of total colonies developing from measured portions planted on gelatin plates and incubated for 48 hours at 20° C.

2. A similar count of total colonies developing on agar plates incubated for 24 hours at 37° C. (or, in some laboratories, incubated 48 hours at 20° C.).

3. The quantitative estimation of organisms of the *B. coli* group by applying specific tests to multiple portions of measured volume.

Of the above, the last-mentioned is almost universally conceded to be the most significant, and for this reason the Committee decided, after due consideration, to include only this test in the standard of bacteriological purity recommended.

Appendix III.

B. coli densities as determined from various types of samples.

This Appendix consists of the mathematical principles applied to the interpretation of fermentation tests. It contains many formulae of considerable complication to those who do not possess the mathematical mind. From these formulae it is demonstrated that :—

1. Where 10 per cent. of the 10 c.c. portions tested are positive the most probable density of *B. coli* is about 1 per 100 c.c., subject, to a probable error which is proportionate to the number of portions tested.

2. Given this or a less mean density, consistently maintained in the water from which the samples are drawn, less than 1 per cent. of the samples in a large series would be expected to show *B. coli* in three or more of the five 10 c.c. portions tested.

Streeter (H. W.). **Some Preliminary Observations from a Study of Water Filtration Plants along the Ohio River.**—*Public Health Rep.* 1925. Jan. 30. Vol. 40. No. 5. pp. 202–213. With 3 text figs. [4 refs.]

Observations were made on the performance of 10 municipal filter plants of the rapid sand type located directly on the Ohio River, and taking their raw water supplies from that stream.

The 10 plants were divided, roughly, into two groups, according to the extent of treatment given to the water prior to filtration.

Group 1 consisted of five plants, three of which used primary plain sedimentation followed by coagulation and secondary sedimentation, and the remaining two made use of coagulation and sedimentation at both stages.

Group 2, also consisting of five plants, employed coagulation followed by a single stage of sedimentation.

The laboratory data were the 20° C. and 37° C. plate counts on standard agar medium, and the *B. coli* index, determined in the raw water and at each successive stage of purification up to and including the final chlorinated effluent. The data covered a continuous period of a full year excepting in one case in which observation could only be carried out for seven months.

The findings are as follows :—

1. With the continuous and effective use of chlorine disinfection

as a re-inforcement to filtration, the plants, considered as a group, apparently are fully able to deliver effluents of such bacteriological quality as is generally considered safe for a very large proportion of the time. Without the aid of chlorination they would undoubtedly be unable to do so.

2. The type of plant represented by Group I is more efficient in bacterial removal than the type represented by Group 2. Of the Group 1 type, plants employing coagulation with both stages of sedimentation are more efficient than those using plain sedimentation as the primary stage.

3. Earlier observations as to the existence of well-defined relation between the bacterial content of effluents and that of influents of water purification processes have been confirmed.

FOOD.

Medical Research Council. **Privy Council, Special Report Series, No. 91. An Investigation of the Salmonella Group, with Special Reference to Food Poisoning.** [Savage (William G.) & White (P. Bruce).]—159 pp. [50 refs.] 1925. London: H.M. Stationery Office. [Price 3s. 6d. net.]

The following paragraphs on food-poisoning as a pathological entity are of particular interest :—

" Salmonella food-poisoning is a disease due, in the majority of instances, to *B. aertrycke*. Our own extensive investigations of food-poisoning outbreaks, our survey of the literature, and of strains isolated by others suggests that, in this country at least, this organism is at present responsible for some three-quarters of the outbreaks. Next in importance as a causal agent is *B. enteritidis*, and it is possible that in this case the outbreaks tend to be particularly severe. During the course of our intensive study of food-poisoning outbreaks (1921-4) this organism has not been greatly in evidence ; during this period we have only made a single isolation and two or three serological diagnoses of this type. It has, however, been several times isolated by others from food-poisoning cases during recent years, and the older literature suggests that it has been more frequently active in the past. It is possibly more prevalent in other countries.

" The Newport type is certainly responsible for an appreciable percentage of outbreaks, and both the Stanley and Derby types, though rare, participate. Though *B. suipestifer* has been known to cause food-poisoning, its importance is insignificant, and *B. paratyphosus B* and *B. abortus equi* are in all probability to be discounted entirely.

" In all the outbreaks, whatever the particular type of organism concerned, the features are essentially the same. The symptoms are those of intense gastro-intestinal irritation, and the violent local action appears to be directly attributable to a heat-stable irritant only extensively developed in those bacillary types responsible for food-poisoning. The brunt of the attack, whether by dead or living bacilli, falls upon the alimentary tract and is probably localized in it in the great majority of cases. Though the evidence is not complete, there is good reason to believe that general infection is exceptional, and that when this does occur death is the rule. The disease is caused by organisms of low invasive power, but with intense toxic action, which

if extended to the body in general, rapidly accomplishes the downfall of the latter. It is almost certainly the comparatively low invasive power of the food-poisoning types which explains the low death-rate (1 per cent. approx.) in a disease of such severity. The fatal cases tend to be associated in our experience with some weakened condition of the intestine such as old colitis, with some such debilitating condition as diabetes, or with infancy and old age.

" The important group of outbreaks which appear to be due to dead bacilli show us the essential features of Salmonella food-poisoning uncomplicated by infection. The cases most commonly met with are those due to the consumption of toxic canned foods. The features are those of acute gastro-intestinal irritation, developing suddenly within 1-4 hours of the peccant meal. In spite of the intense symptoms the sufferer is usually well on the way to recovery in 24-48 hours, recovery being the almost invariable rule. The sera of sufferers seldom show any appreciable development of agglutinins for Salmonella bacilli, and no pathogenic bacilli can be isolated from the food or faeces.

" The implication of the Salmonella group in this series of outbreaks is highly probable but difficult to prove. We have, however, found that known toxic canned foods, even after heating to 100° C., act upon the stomach of laboratory animals in the same irritant way as do similarly heated emulsions of Aertrycke and Enteritidis bacilli, and that these animals are just as unresponsive in general symptoms to the one as to the other. We have further shown with some certainty that when an emulsion of *B. aertrycke* or of *B. enteritidis* is heated, its irritant action tends to be accelerated ; this would suggest a reason for the regularly early onset of canned-food-poisoning. (We have failed to show that this acceleration of action is due to the increased digestibility of the bacilli with liberation of toxin. Unlike living bacilli, boiled bacilli are rapidly digested by trypsin, but this treatment seems to reduce the irritant value of the culture.) These facts increase the probability stated above, but do not clinch the point. We have, however, been able to show that when toxic canned foods are emulsified and injected into animals, feeble agglutinating sera for Salmonella bacilli may sometimes be obtained. That these sera almost always cause a purely granulating agglutination of the usual food-poisoning types is exactly in accord with expectation, but owing to the low titre of the sera and lack of knowledge as to the specificity of granulating agglutinins we cannot yet offer this as conclusively implicating Salmonella bacilli in all canned-food-poisoning outbreaks."

A. A.

Medical Research Council. **Privy Council, Special Report Series No. 92. Food Poisoning. A Study of 100 Recent Outbreaks.** [Savage (William G.) & White (P. Bruce)]—112 pp. 1925. London. H.M. Stationery Office. [Price 2s. 6d. net.]

This most valuable contribution to the literature should be added to the library of all concerned in Food and Food Poisoning. In the space available it will be possible only to indicate the main points, and the enquirer will need to refer to the report in the original to gain full advantage from the communication.

Section II deals with a Consideration of the Bacterial or Other Cause of the Outbreaks. The causes are divided into the following six groups :—

Group I. Cases associated with infection of the food with members of the Salmonella (or Gaertner) group of bacilli.

(*a*) Outbreaks due to living Salmonella bacilli.

(*b*) Outbreaks due to the presence of undestroyed Salmonella group toxins.

Group II. Outbreaks associated with organisms of dysentery type. (Since the exact serological affinities of these strains are still under consideration the term " dysentery " is used in a comprehensive sense.)

Group III. Botulism group.

Group IV. Outbreaks associated with cheese.

Group V. Outbreaks of definite chemical origin.

(The word " chemical " is here restricted to outbreaks due to chemical substances of a known molecular grouping and not to complex bodies derived from the vital activities of bacteria.)

Group VI. Outbreaks of undetermined origin.

Group I is of such importance in connection with the causation of food poisoning that some of the salient bacteriological data in regard to it are briefly reviewed.

The following table may be accepted as an estimate of the present knowledge of the group.

Disease Producing Role.

Type.	Man.	Animals.
B. paratyphosus A. ...	Paratyphoid fever ...	Not found.
B. enteritidis ...	Gastro-enteritis of food poisoning type. Occasionally sporadic cases of illness.	Disease of cows and calves. Disease of rats. Probably also in other animals.
Derby	Human food poisoning	Pigs ; exact disease-producing role unknown.
B. paratyphosus B. ...	Paratyphoid fever. Probably never food poisoning.	*Not found.
B. aertrycke	Food poisoning. Sporadic cases of illness (possibly).	A widespread cause of enteritis in mice, guinea-pigs, and other rodents. Enteritis in parrots and other birds. Occasionally found in pigs. Occasionally a cause of calf enteritis. Does not occur commonly in rats.
Stanley	Food poisoning ...	Not yet isolated from animals.
Newport	Food poisoning. Possibly sporadic cases of illness.	Dogs suffering from enteritis, otherwise not known in animals.
Reading	Inadequate knowledge	Not so far isolated.
B. abortus equi ...	Not found	Abortion of horses
B. suipestifer ...	Paratyphoid (C type) fever. Food poisoning (very exceptionally).	Secondary invader in pigs in Hog Cholera. Occasionally as a primary cause of disease in pigs.

* Some authorities claim to have isolated *B. paratyphosus B* from diseased animals.

As regards outbreaks due to the presence of undestroyed Salmonella Group toxins, which is a very important group, particularly in relation to canned foods, the methods of elucidation are given as : (*a*) Demonstration of the toxicity of the food by feeding animals with it or by injecting extracts of the suspected food into animals ; (*b*) demonstration of the production of specific agglutinins in the blood of patients suffering from food-poisoning ; and (*c*) demonstration of the production of specific agglutinins in animals through the injection into them of suitable emulsions of the incriminated food.

Group II. Outbreaks associated with organisms of the dysentery type are of peculiar interest in that this group of bacilli has not hitherto been recognised as capable of causing food poisoning. The symptoms in these outbreaks were in almost all cases definitely of the food-poisoning type, and not dysenteric.

In Group V, outbreaks of definite chemical origin, arsenic is at once the best known and most important. One example of poisoning by zinc and one by belladonna are cited. It is noteworthy that, although special attention was paid to canned food outbreaks, no instances of tin poisoning were found.

A summary of the 100 cases is given :—

Outbreaks probably not true food poisoning	3
Outbreaks due to members of the Salmonella Group ...	66
Outbreaks due to members of the Dysentery Group ...	4
Outbreaks due to *B. botulinus*	1
Outbreaks of definite chemical origin	2
Cheese-poisoning outbreaks	8
Mild evanescent outbreaks...	9
Outbreaks of undetected bacterial origin	7
	100

In no instance has there been any evidence that *B. coli*, *B. proteus* and Morgan's bacillus had anything to do with the causation of outbreaks dealt with in this series.

Sections III deals with epidemiological features.

As regards seasonal prevalence it is confirmed that outbreaks are decidedly more numerous in the warmer months.

In the following table, the outbreaks are distinguished as :—

B. Due with certainty or strong probability to living bacilli.
T. Due to toxins of the Salmonella Group.
U. The rest of the outbreaks. Most due to bacteria, and probably living bacteria, but classification uncertain.

Period.	No. of outbreaks.				Percentage prevalence.			
	All.	B.	T.	U.	All.	B.	T.	U.
6 "hot" months (May-Oct. incl.)	72	28	18	26	72	85	58	72
6 "cold" months (Jan.-Apr., Nov.-Dec.)	28	5	13	10	28	15	42	28
	100	33	31	36				

In this country the distinction between "hot" and "cold" months is somewhat arbitrary ; still, the outbreaks due to living bacilli show a marked prevalence during the summer.

The following possibilities are suggested to account for the seasonal

prevalence being so definite, especially for the outbreaks due to a living bacillus :—

"1. A greater virulence of Salmonella strains in hot weather.
2. A larger dose due to greater multiplication on the vehicle before ingestion.
3. Greater opportunities for infection of food in summer.
4. A greater sensitiveness of the alimentary tract of the human host in warmer months."

As regards the physical condition of the incriminated food, the present series shows that, with few exceptions, the food was almost invariably perfectly good to the physical senses when eaten.

A table shows that nearly all the outbreaks from undestroyed Salmonella toxins were from canned foods. Made-up meat infections are mainly associated with living bacilli.

The infectivity rate is, in general, high ; often all who ate the incriminated food were made ill. The influence of cooking is obviously of importance.

Case to case infectivity is rare in food poisoning outbreaks, and the present series supports this view.

As regards the prevalence in institutions, an unusually large number (11 per cent.) in the present series of outbreaks occurred in asylums, workhouses, hospitals and schools.

Section IV deals with clinical features.

The symptoms were almost invariably those of gastro-intestinal irritation or inflammation of various degrees of severity.

Section V treats of certain special types of food poisoning.

Botulism is first noted. The onset of symptoms is usually from 18 to 36 hours after ingestion of the poison, but it may be considerably advanced or delayed. As a rule, the onset is gradual. Symptoms may be grouped as follows :—

(1) Vision and eye disturbances.
(2) Throat symptoms.
(3) General muscular weakness.

Nearly as important as the positive signs is a consideration of those which do *not* occur.

Sensory disturbances. Apart from any initial gastric distress or headache the patient usually suffers no pain.

Abdominal symptoms. Apart from the initial irritation there is no abdominal pain and constipation is usual.

Mentality. Mentality and consciousness usually remain clear until shortly before death. Apathy and somnolence are characters only of the later stages.

Temperature. Any fever is rare, and the temperature is usually subnormal. Later in the illness the pulse rate may be markedly increased. The combination of subnormal temperature and rapid pulse is an important diagnostic point. Respiration is not disturbed until quite late. The sphincters are not affected.

As to the material to submit for bacteriological examination, two lines of proof are available :—

(1) The isolation of *B. botulismus.*
(2) Demonstration of the presence of botulinus toxin.

To aid in securing proof the following materials should be submitted :—

(1) *The suspected food.* Every endeavour should be made to secure some of this, even minute quantities may be adequate. Traces

adhering to jars ; remains in tins, even if thrown away, are all worth transmitting.

(2) *Post-mortem material from fatal cases.* All the different organs, and particularly pieces of the large and small intestine, should be transmitted.

(3) *Clinical material.* Blood specimens for agglutination are useless, except to exclude Salmonella food-poisoning. Samples of faeces may show spores, but this is doubtful.

Section VI deals with the Paths of Infection.

Special attention was directed to infections by the Salmonella Group because these organisms are responsible for all the important and severe outbreaks of food poisoning in this country.

Investigators have frequently accepted the explanation that the food has been subject to ordinary excretal contamination. This, however, cannot be a satisfactory explanation, as the infection is due to a *specific* bacillus, and there is no evidence that such bacilli are natural inhabitants of human or animal intestines.

As a primary reservoir of infection there are three possibilities :—

(1) A habitat outside the animal (including human) body.
(2) Infection from a human case-infected sufferer or passive carrier.
(3) Infection from an animal source-specifically infected animal or passive carrier.

As regards the above :—

A habitat outside the animal body of Salmonella bacilli.—This is possible, but there are no facts that suggest that it is probable.

Infection from a human case.—From the scanty facts available it is suggested that *B. aertrycke* and *B. enteriditis* are unlikely to accommodate themselves to a saprophytic life in the human intestine, and are usually eliminated soon after recovery.

The view is expressed that human carrier-infection is, at the most, a very rare source of infection of the food in food-poisoning outbreaks.

Infection from an animal source.—Two possible sources of infection have to be distinguished :—

(1) Due to the meat or milk of an animal infected with a Salmonella bacillus being used as part of the implicated food.
(2) Due to sound food being infected with bacilli derived from an animal either suffering from a Salmonella infection or acting as carriers of such bacilli.

In one outbreak *B. aertrycke* was isolated from one of the cows of a herd, the infection was traced back to this herd and to the mixed milk which contained milk from the diseased animal. In another outbreak in which 25 cases were due to the consumption of mutton, *B. aertrycke* was isolated from the bone marrow of the joint of mutton, as well as from other sources.

In at least six outbreaks there was clear evidence that only part of the contents of the tinned-food was toxic, sometimes the unsound portion was at the narrow end of the tin, and at others at the broad end. If it be agreed that the meat from an infected animal is contained in the tin, it is very difficult to conceive that such infected meat should be confined to one end of the tin. On the other hand infection of a sound meat in the tin or when being introduced into the tin would be confined to portions of meat in direct continuity, and the phenomenon of one part only being toxic is explainable. This fact strongly suggests that infection was post-mortem, and not ante-mortem.

A point which is of great importance, and which is well illustrated

in the present series, is the frequency with which the vehicle of infection is a food which has been heated and then allowed to cool slowly.

Though the fly as a transmitter of infection cannot be refuted, there was no positive evidence in favour of a fly vehicle in the series of outbreaks under review.

Section VII deals with the prevention of outbreaks of food poisoning.

Section VIII deals with the investigation of food poisoning outbreaks.

Three important circulars have been issued to Medical Officers of Health in this connection.

"1. Memorandum by the Local Government Board on the investigation of outbreaks of illness suspected to be due to food poisoning. Issued in September, 1911.

2. Steps to be taken by Medical Officers of Health in cases of suspected food poisoning. Issued by the Ministry of Health, January, 1921.

3. Food Poisoning Inquiries. Issued by the Ministry of Health, 10th August, 1921.

4. Food Poisoning Inquiries. Issued by the Ministry of Health, 1st April, 1924."

The circular of August, 1921, includes a memorandum upon the collection and transmission of samples. This memorandum, in an extended and amplified form resulting from additional experience, is reproduced in the present Report.

CONSERVANCY.

BARNES (M. E.). **The Utilization of Solar Light and Heat in the Treatment of Night Soil.**—*Amer. Jl. Hyg.* 1925. Mar. Vol. 5. No. 2. pp. 202–216. [11 refs.]

This is a suggestion for experimenting with a de Saussure box in the treatment of night soil, the action of the solar light and heat rendering it incapable of transmitting infection, especially as regards protozoa and helminths.

In 1766 DE SAUSSURE invented a "hot box" which consisted of an insulated air-tight wooden box, blackened inside, and covered with two layers of plain glass with an air space between them. In 1837, Sir John HERSCHEL experimented with a similar box and recorded a temperature of 248° F. on December 5th with such an apparatus enclosed in a second glass covered box, whose sides were banked with sand for protection, as were those of the inner box. Subsequently, he cooked eggs and other articles of diet in his "hot box." In 1883, a description was published by J. HARDING of a distillation plant erected in Chili which operated on this principle. This plant produced 5,000 gallons of distilled water per day during the summer months.

The present experiments were carried out by the writer in Siam. The de Saussure box employed consisted of a pine-wood box 20 by 14 by 6 inches in length, width and depth respectively, the boarding being approximately 1 in. thick. A shallow tin vessel, made by splitting a five-gallon oil tin longitudinally, was placed in this box and a tight-fitting cover of window glass was provided. The tin was blackened to increase the absorption of the solar rays. Controls were carried out with similar apparatus without any glass covering. The boxes were placed flat on the ground in such position as to receive

the direct rays of the sun, but no change was made in their position to correspond with changes in the elevation of the sun. Thermometers were placed in the boxes to record the temperatures observed.

In one series of experiments the maximum temperature in the covered box was 200° F. (93·3° C.) and for a period of more than six hours it exceeded 126° F. (52·2° C.). In the control box without a glass cover the maximum was 124° F. (51·1° C.), which was maintained for only about 15 minutes. A litre of water introduced into the tin vessel was on four days recorded to reach 158°, 150° 146°, and 154° F. respectively, and, moreover, was maintained at above 122° F. for periods of 4 to 5 hours on each of these days, during which it should be noted there was no clear sunshine, excepting on one afternoon. In these experiments a single layer of glass was used.

In another series of experiments using a box with a double glass cover with 1 in. interspace, 5 gallons of crude oil were raised on two occasions to 142° F., and once the oil was maintained at over 122° F. for more than five hours.

There is considerable loss of heat involved if the box used is too deep, owing to interference with the passage of the sun's rays by the sides. It is probable that 12 to 15 inches in depth might be used without too great a loss of heat resulting.

In a double glass covered box experiments were conducted with faecal matter containing hookworm ova and newly-hatched, active larvae. Ten specimen tins of quarter-oz. capacity were exposed, the covers of the tins being removed, in the de Saussure box, from 12 noon to 1 p.m., during which time the thermometer in the box registered 220° F. After removal from the box, the larvae were found to be dead, and no larvae developed from the faecal matter, which was mixed with moist soil and examined daily for the period of one week. Opportunity to continue this line of investigation was lacking.

Boeck (1921) gives the thermal death point of protozoan cysts as follows, heavy mortality in all cases beginning at temperatures approximately 10 degrees below the maximum :—

E. histolytica	68° C.	*Iodamoeba bütschlii*	64° C.
E. coli	76° C.	*Giardia intestinalis*	64° C.
E. nana	64° C.	*Chilomastix mesnili*	72° C.

Intestinal helminths are even more vulnerable to heat. Asada (1923) states that Ascaris larvae in the egg shell are killed if heated for 10 minutes at 50° C. Stiles (1921) has indicated the effects of various temperatures upon hookworm ova and larvae as follows :—

40°–50° C.—Eggs have been observed to hatch at 40° C., but in general, constant temperatures above 37° C. are reported as unfavourable to fatal for eggs and larvae. However, both eggs and larvae can stand 40°-50° C. for a few minutes and live.

50°-60° C.—Fatal to eggs and larvae in 1 to 5 minutes.

Above 60° C.—Fatal to eggs and larvae almost instantly.

Tsutsui (1924) has shown that 55° C. is the highest temperature to which hookworm ova and larvae can be exposed and live. On account of the coagulation of tissue fluids which takes place at temperatures around 60° C., it is highly improbable that any of the animal parasites could survive more than momentary exposure to such temperatures.

As regards the bacteria, Jordan (1921) states that " the vegetative forms of most bacteria are killed at 55°-58° C. by 10 minutes exposure to moist heat." He places the thermal death-point of the typhoid bacillus and of the spirillum of Cholera at 58°-60° C.

There appears to be little doubt that, under laboratory conditions, if these various organisms are brought to the actual temperatures indicated, they are killed. The question is whether the constituents of night soil are such as to protect the organisms from reaching the fatal temperatures; the depth of penetration of the heat into faecal matter exposed in the boxes has not yet been determined.

The author is of opinion that the interruption in days of sunshine would make it impracticable as the sole method of treatment, but considers that this method may well prove a valuable supplementary means of treatment in communities where the bucket system of collection is in operation. As such, he hopes that investigators in widely separated regions will undertake experiments with the apparatus.

LEVERMORE (F. E.). **Sanitation in British Guiana.**—*Jl. Roy. San. Inst.* 1925. Mar. Vol. 45. No. 10. pp. 433–438.

In this paper a general account of sanitation in British Guiana is given. It is of interest because it deals with the conditions in a country which is, in parts, very flat and, indeed, lying from 4 to 5 feet below sea level. Pit latrines in low-lying land have been successfully designed: a mound of earth 2 ft. high is prepared through which a pit is dug, penetrating the soil until just before the sub-soil water is reached. Upon this mound a structure is erected, and the earth gained from the pit is close-packed around, with the object of preventing access to fowls and pigs.

Thus designed, the life of a pit may be considerably over a year, and when full an excavation is made at one side of sufficient depth to allow of the contents being removed and dealt with. The pit is treated periodically with an emulsion of crude petroleum and soap, with the addition of a small quantity of crude carbolic, if desired. The method is stated to work efficiently, economically, and without causing nuisance, provided it is properly carried out.

KOBAYASHI (Harujiro), SHIIBA (Yoshiya) & MIDZUSHIMA (Haruwo). [**Studies on the Hygienic Disposal of Sewage. Communication I.**]—*Tokyo Ijishinshi* (*Tokyo Med. News*). 1925. Jan. No. 2404. [Summarized in *Japan Med. World.* 1925. Mar. 15. Vol. 5. No. 3. p. 68.]

The authors carried out experiments for the employment of garbage as such, for manuring purposes. Admixture was made with peat, but the proportion of the materials is not mentioned in the summary. *B. coli* was killed in 13-17 days or more; *B. typhosus* in 6-7 days; ascaris eggs required 1-3 months. Further particulars will be given in a future paper.

SMALLPOX VACCINATION.

OWEN (W. E.). **The Kavirondo Practice of Inoculation with Smallpox.**—*Kenya Med. Jl.* 1925. Feb. Vol. 1. No. 11. pp. 333–335.

Amongst both the Bantu and Nilotic Kavirondo a custom pertains of taking pus from a smallpox patient, mixing it with a native prepared powder, and inoculating people with the preparation so as to induce a mild form of smallpox.

The origin of the custom is lost in the dim past, but some state that it was first taught by the Masai. The receipt for the preparation of the powder is a well-guarded secret, and it is very difficult to get the "medicine men" to divulge what tree or shrub is used in making the powder. The tree from which the preparation is made is planted in some secret place in the bush, and the fallen leaves and roots are used. Only those leaves that have fallen right side up are taken, they are then burned and the ashes are used with the finely-pounded dried root, the mixture being ground together.

When smallpox breaks out and it is decided to inoculate, the medicine man is called. He brings the powder and, obtaining some pus from a ripe pustule, mixes it with a little of the powder. The person to be inoculated is incised in two places, and the mixture of powder and pus is dusted into the cuts. The inoculators say that, in three days, if the person is a woman, or in four if a man, the site of inoculation shows that the pus has taken effect, and that in a week the patient will be out all over in smallpox.

The medicine men assert that the inoculation is never followed by fatal results, but a mild form of the disease shows itself. One man questioned made the statement that he and his family had treated hundreds and never had a death occurred as a result of the inoculation.

NOTE.—A small quantity of the powder has been examined by the Government Analyst, Mr. W. Colet BIRCH, with the following result :—

The powder was yellow-brown in colour and neutral to litmus. Under the microscope all that was seen was what was apparently plant tissue of a pink colour. From 1·15 gms. an extract was obtained weighing 3·2 mgms. This residue was intensely bitter, and gave the general reaction for alkaloids with gold chloride, phosphomolybdic acid and iodine. The extract from a further quantity of 0·6 gm. of powder gave the blue colour characteristic of morphine with Fröhde's reagent, but further tests failed to confirm its presence. Strychnine is absent. The small amount of powder available for analysis did not permit of the establishment of the identity of the alkaloid which appears to be present.

JAMESON (R. W.). **Concerning the Two Types of Smallpox and the Administrative Methods applicable to them.**—*Lancet.* 1925. Jan. 10. pp. 92–94.

A summary of this article is as follows :—

1. *Nomenclature.*—The author suggests one that can only be provisional until more is known of the nature of the virus concerned in variola major and variola minor respectively. One recognises this by using these two terms which take note of their clinically allied nature and their main difference, that of virulence, while they are calculated not to confuse the clinician as the terms mild and severe might do.

2. *Vaccination.*—Owing to the widespread objection to submit to vaccination and also to the fact that the immunity conferred by vaccination only lasts for a term of years, the present attempt to control smallpox by the wholesale vaccination of infants has failed. It is suggested that variola outbreaks would be better controlled if governmental vaccination effort were confined to treating outbreaks, and then used intensively, that in the presence of variola major one cannot have too much vaccination, and therefore increased powers of compulsion are necessary for those times.

3. *Administration.*—That the areas of smallpox administration should be enlarged as making for efficiency and economy in dealing with the disease. That the efficiency of the machinery in use for dealing with this and other diseases would be enhanced if the Privy Council from time to time assessed the value of the procedure employed.

LEDINGHAM (J. C. G.). **Alastrim and Variola. The Experimental Side of the Question.**—*Lancet.* 1925. Jan. 24. pp. 199–201. [9 refs.]

Summary :—

"1. Mild smallpox behaves like ordinary smallpox when transferred directly to the monkey.

"2. Direct transference to calves and rabbits is uncertain, and is most likely to fail, though the chances of securing some sort of atypical take at the first attempt would appear to be greater than in the case of variola. There may doubtless be slight differences between the various alastrims with respect to their animal affinities.

"3. Variolization of the calf can be accomplished by the usual passage methods.

"4. Allowing for certain peculiarities which distinguish the experiments with Australian alastrim, there would seem to be no doubt that the mild smallpox of English origin behaves in all important respects like ordinary variola.

Conclusion :—

"The persistently non-toxic and non-lethal character of the prevailing smallpox is consistent with the view that the virus concerned is merely a variant of variola whose toxic properties for the human organism have become suppressed, while its affinities for other animal species have not appreciably changed. The intrinsic and epidemiological peculiarities of mild smallpox suggest tempting analogies with certain features exhibited by non-toxic or non-virulent varieties of bacteria generally, which recent research on bacterial variation has disclosed."

DISINFECTION.

TRIMBLE (H. E.). **The Vacuum-Cyanide Method of Delousing Clothing and Baggage. Experimental Data upon which the Procedure at the New York Quarantine Station is based.**—*Public Health Rep.* 1925. Feb. 20. Vol. 40. No. 8. pp. 335–351. With 5 figs on 3 plates. [4 refs.]

Methods of disinfesting clothing and baggage by steam are not entirely satisfactory. Felt, rubber, leather, fur and other materials are frequently made up into clothing, or bags and trunks which almost invariably have leather, paper, and glue about them, are damaged by steam. It requires time and labour to open each package, sort out the articles that steam would damage, sterilize the remainder, and repack. The ideal method should kill all animal and insect life within a package that has neither been opened nor unlocked, and do it without damage to the contents. It should also be sufficiently rapid to allow clothing to be disinfested while the owner is taking a bath.

In 1916 Surgeon GRUBBS introduced a method of treating clothing

and baggage with a vacuum hydrocyanic acid gas process. This was first done at the Boston Quarantine Station, and in 1921 the method was introduced at the New York Station, and at the latter place more full investigation was directed to determine the limitations of the vacuum cyanide process, or to find something better.

The conclusions arrived at were as follows :—

1. The process is an improvement over the steam method since the packages are undisturbed and the contents uninjured. It has, however, distinct limitations.

2. Cyanide gas penetrates fabrics so slowly that it is applicable only to delousing when aided by an initial vacuum ; the higher the vacuum the quicker and deeper the penetration.

3. For efficiency and practicability three important factors are necessary—concentration of the gas, degree of the initial vacuum, and length of exposure.

4. Lice and lice ova are easily killed by cyanide gases. The minimum lethal concentration of HCN gas at 15 minutes exposure was determined to be that from about 18 ounces of sodium cyanide per 1,000 cubic feet.

5. Vacuums of 26 in. of mercury and air pressures of 15 lbs., or combinations of these, but without gas have no effect on lice or ova even if used over longer periods of time than those used in actual delousing.

6. An air pressure of 15 lbs. produced and held after the introduction of gas into the chamber does not materially aid in the penetration of the gas.

7. Dry heat of 72° C. with a vacuum of 26 in. and 15 minutes exposure did not appreciably aid the vacuum in the penetration of the gas.

8. A secondary vacuum is of aid in clearing gas out of bundles of clothing.

9. High concentrations of HCN require that materials be well ventilated after fumigation.

10. The odour and lachrymatory effect of CNC1-HCN gas mixture (cyanogen chloride-hydrocyanic gas) may ventilate out and yet leave a dangerous amount of HCN gas in fabrics. Hence there is no advantage in using CNC1-HCN rather than HCN.

11. Ship fumigation with cyanide gases (5 ounces sodium cyanide per 1,000 c. ft. for 2 hours without a vacuum) cannot be expected to kill all lice or ova.

The following recommendations were made :—

(*a*) That HCN gas be continued as a routine delousing agent for the clothing of immigrants, using from 143 to 285·7 ounces sodium cyanide per 1,000c. ft. (12 to 24 ounces per 84 c. ft. chamber), or from 72 to 143 ounces of liquid HCN ; that the initial vacuum be 26 in. ; and that the exposure be at least 30 minutes.

(*b*) That in loading the sterilizing chambers the clothing bags and the baggage be placed on wire racks, thus separating them somewhat, rather than packing them in tightly without the racks.

(*c*) That, after fumigation, the clothing bags be hung up, out of doors if possible, but at least in a stream of fresh air, until odour of gas disappears, before being returned to the immigrants.

(*d*) That the same concentration of gas and initial vacuum as recommended for clothing bags be used for baggage, but that the exposure be for one hour. That the covers of trunks and other very large cases be opened for fumigation. As it usually is at least 8 to

24 hours after fumigation before the immigrant has the opportunity of unpacking his larger pieces of baggage, airing of the same is not necessary.

(*e*) That the clothing of immigrants with typhus or exposed to typhus be sterilized by the vacuum pressure steam process; shoes, hats, suit cases, etc., which steam would injure, to be subjected to the standard vacuum cyanide process.

A few tests were made with other gases, but they indicated that to obtain good results such high concentrations would be necessary that the cost would be prohibitive and the time of the fumigation process too long. The gases experimented with included ether, chloroform, carbon bisulphide, carbon tetrachloride, and formaldehyde.

NEWSTEAD (R.), EVANS (Alwen M.) & POTTS (W. H.). **Report on the Investigation into the Destruction of Vermin by Hydrogen Cyanide, with Especial Reference to Bed Bugs.**—*Ann. Trop. Med. & Parasit.* 1925. Mar. 31. Vol. 19. No. 1. pp. 91–118. With 1 plate & 6 text figs.

This investigation was carried out at the request of the Liverpool Port Sanitary Authority, with the object of determining the efficacy of various strengths of Hydrogen Cyanide in the destruction of vermin, especially bed bugs, under natural conditions on board ship.

In ships, the bed bug favours similar situations as in houses, but one or two special sheltering places require attention. Tongue and groove matchboarding, which so often covers partitions, forms a very good refuge, especially when there is a certain amount of space behind the tongue and groove boarding into which the bugs can penetrate. The framework of bunks is also of importance. In certain types of bunks the frame consists of hollow tubes with small openings at the ends. Upright stanchions with loose fitting sockets at either the top or the bottom provide access into the tube easily available to bugs. A third refuge on board ship was found in piles of life-jackets, in the folds of the canvas coverings of which bugs were present. The above situations demand special attention as they afford exceptional protection for the vermin against the action of the gas.

As the result of the investigation the following facts emerged :—

1. A concentration of 0·2 per cent. of Hydrogen Cyanide acting for 3 hours, or 0·3 per cent. acting for 1 hour is not sufficient to kill every bug.

2. A concentration of 0·3 per cent. of the gas acting for 3 hours will kill all bugs present, except where they can retire behind tongue and groove boarding.

3. Eggs of bugs are not more resistant to Hydrogen Cyanide than are the adults.

4. A concentration of 0·3 per cent. of the gas acting for 1 hour is sufficient to kill lice, both adults and eggs. A concentration of 0·2 per cent. of gas even if acting for 3 hours does not kill.

5. A concentration of 0·2 per cent. of gas acting for 3 hours kills both fleas (adults and larvae) and rats.

6. Spraying with liquid cyanide gives better results than does the dumping method as it tends to give a more uniform concentration throughout the area.

The recommendations made were as follows :—

(*a*) That a concentration of 0·3 per cent. of Hydrogen Cyanide acting for a period of 3 hours should be used.

(*b*) That where matchboarding is present, one or two boards should, if possible, be removed, in order to allow the gas easy access into the cavity behind.

(*c*) That where bunks with hollow metal frames are present they should be taken to pieces, when this is practicable, and the tubular portions laid horizontally, so that the gas can penetrate easily into their interior. Or better, as a preventative, the ends of the tubing should be hermetically sealed.

HARNED (R. W.) & ALLEN (H. W.). **Controlling Bedbugs in Steam-Heated Rooms.** [Abstract.]—*Jl. Econom. Entom.* 1925. Apr. Vol. 18. No. 2. pp. 320–329. With 2 text figs.

During the summer of 1924 experiments were conducted in the dormitories of the Agricultural and Mechanical College of Mississippi for the control of bedbugs, *Cimex lectularius* Linn, by heat.

Superheating of the infested rooms was secured by closing the rooms and turning on the steam during the hot summer weather. At temperatures of 120° F. and above, absolute control was secured by treatment of several hours' duration. A very high percentage mortality was secured by exposure to temperatures averaging 110° F. when maintained for two days or more.

The results obtained by the treatment of 350 dormitory rooms have proved so much better in respect to the saving of labour, safety and effectiveness than the method of fumigation with hydrocyanic acid gas that the latter method has been abandoned in favour of superheating for control of this pest.

During the trial it was found that the temperatures attained varied considerably in the different rooms. Rooms facing south received the additional heat of several hours of sun, and in most cases attained a higher temperature than rooms facing north and receiving no sunlight. Several rooms were discovered in which the temperatures were far below the average as the result of defective heating units. The daily fluctuations of temperature in the rooms closely followed the usual outside fluctuations, rising from the lowest in the morning to the highest in the late afternoon and falling away again at night.

Up to December 27th, 1924, not a single complaint about bedbugs has been received from any of the rooms that were the subject of experiment, although the rooms have been occupied almost continuously, and some of them have been carefully inspected. Total mortality can be secured by a few hours exposure to 120° F.; a very high percentage mortality can be secured at as low a temperature as 110° F., when this is maintained for two days.

The advantages of the method are detailed as follows:—

Labour outlay is much less, since it is not necessary to seal cracks, place fumigants, or handle furniture. No expert manipulation is required as the process can be managed by the regular organisation of hotels, hospitals, and dormitories or by residents of houses without calling in outside assistance. The method is safe, wood-work is not apparently injured; it is effective, nymphs and adults being destroyed with equal readiness, and this is also apparently true of the eggs. Results can be determined at any time during the process as the rooms may be entered for short periods without excessive discomfort. In degree of penetration this method equals fumigation at its best, and it is far superior to application of contact insecticides by hand.

DE ALMEIDA (Eurico). **O valor da desinsecção como arma profiláxica no combate de pestilências exóticas.**—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 3. 3a., 4a. e 5a. Sessões.) 1923. Aug. No. 4. pp. 35–39. With 9 figs.

By means of a simplified form of the Canadian Disinfestor, two of which were in use, the author succeeded in stamping out in five months a fairly severe epidemic of "spotted fever" [apparently typhus], in which 2,068 persons were attacked and 523 died. During this period 116,813 articles of clothing belonging to 27,000 lousy persons were disinfested, and the author speaks in terms of high praise of the value of this apparatus for dealing with insect-borne diseases.

H. Harold Scott.

CHILD WELFARE.

CHINA MEDICAL JOURNAL. 1924. Nov. Vol. 38. No. 11. pp. 923–929.—**Child Labour in China.**

The subject having been brought to the notice of the Municipal Council of Shanghai, a commission was appointed in January, 1923, "to inquire into the conditions of child-labour in Shanghai and the vicinity, and to make recommendations to the Council as to what regulations, if any, should be applied to child-labour in the foreign settlement of Shanghai, having regard to practical conditions and to local conditions generally." In July, 1924, the Commission presented a unanimous report. Amongst the witnesses who gave evidence were doctors, officers of the Municipal Service, employers, contractors, and social service workers.

In the report the industries in which the children are employed are divided into three main groups: (*a*) Domestic service; (*b*) shops, workshops, laundries, and the building trades; (*c*) mills, factories, and similar places of industry.

The medical evidence taken by the Commission may be summarized as follows:—

The country children in China are of good physique, whilst those living in the cities are, generally speaking, below the standard of Western countries. Tuberculosis is particularly prevalent in the towns. One witness expressed the opinion that the children were worse off in the modern factories than in their native homes, because of the humidity of the air which was bad for the tuberculous child. Crowded living conditions are to a great extent responsible for the poor physique observed. By all it was agreed that the existing industrial conditions in Shanghai are extremely adverse to the bodily and mental welfare of the Chinese child employee. Such children, as a body, were said to be physically inferior to those not employed, but no definite measurements or other particulars are given. Industrial accidents were largely attributed to fatigue and carelessness following on long hours of monotonous work.

The Commission made the following main recommendations:—

1. Power should at once be sought to make and enforce regulations prohibiting the employment in factories and industrial undertakings of children under 10 years of age, rising to 12 years within four years from the date when the regulations come into force.

2. Children under 14 years of age should not be employed for longer than 12 hours in any period of 24 hours, such period of 12 hours to include a compulsory rest of 1 hour.

3. Night work for young children is such a serious evil that, while at present, owing to specific difficulties, no action seems possible, the question should be further considered by the Council at the end of a period of four years.

4. Every child under 14 years of age employed in factories and industrial undertakings should be given 24 hours continuous rest in at least every 14 days.

5. The employment of children under 14 years should be prohibited at any dangerous unguarded machine, in any dangerous or hazardous place, or at any work likely seriously to injure body or health. Power of closure of any dangerous or hazardous premises where such children are employed, until they are made safe, should be sought.

MEDICAL INSPECTION OF SCHOOLS.

CHUBB (Elsie M.). **Defects in School Children in the Cape Province.**—*S. African Med. Rec.* 1925. Feb. 28. Vol. 23. No. 4. pp. 67–69.

In reckoning the statistics given only those children are included who fall into what is known as the "routine age groups." In 1924, the routine age groups included all children born in 1909 and 1916; with the very mobile school population that appertains, this is the best way of insuring that children who move from place to place are not left out. The years are chosen so that children are seen shortly after their admission, and again towards the close of the compulsory school course. The statistics of the routine age group give the average condition of the school-going population.

In reckoning defects there must be some sort of convention as to the standard adopted. If all minor departures from normal were included the figures would be much swollen, and would have little value.

SUMMARY OF STATISTICS.

	Number examined in age groups.		Percentage defective.		Percentage recommended for treatment.	
	1922.	1923.	1922.	1923.	1922.	1923.
Boys	4,009	4,271	40·2	37·3	23·6	22
Girls	4,314	3,993	38·4	36·3	23	23
Total ...	8,323	8,264	39	37	23	23

37–39 per cent. of children in the routine age groups have defects sufficient to act as a handicap to efficiency and health, and 23 per cent. actually needed treatment and were recommended to obtain it.

Dental decay accounted for 14-16 per cent. of the defects, only cases of oral sepsis or cases with four or more decayed teeth being included: had all cases of dental caries been included the percentage in many areas would be from 80-90 per cent.

It was noticeable that malnutrition, physical defects and the poor white problem run parallel; some of the poor white colonies seem to be breeding grounds for physical inefficiency, to say nothing of mental defect.

Eye defects are considerably higher in girls than in boys; it is thought that the cause is due to the amount of needle work, music and indoor occupation expected of girls compared to the more out-door life of the boys.

The tendency to enlarged tonsils and adenoids is more marked on the Karoo and in dusty towns than at the sea coast.

Tonsilitis, heart lesions due to rheumatism and chorea are commoner at high altitudes than in the damper coast area.

Trachoma occurs in Namaqualand, round about Knysna, Oudtshoorn, and down the Gamka valley, all of which places have a high proportion of poor whites.

Tuberculosis amongst European children is almost always of the bone, joint, or gland variety. Lung tuberculosis is frequently present amongst coloured children.

As a cause of crippling in the country infantile paralysis ranks much higher than tuberculosis. It is the impression of the writer that it is much commoner at high altitudes than at the coast.

Orosa (S. Luna). **Health Inspection of School Children.**—*Jl. Philippine Islands Med. Assoc.* 1925. Jan. Vol. 5. No. 1. pp. 23–24.

An individual health inspection, held at Meisic in 1924, for the detection of communicable and contagious diseases and physical defects of children who were to be admitted into the city schools gave the results shown in the following table. The children were of varying ages, since they included primary, intermediate, and high school pupils, thus ranging from just over 7 up to 20, 25 years or over.

Of the 10,237 children examined only 3,710, or 36 per cent., showed no defects or diseases. 500, or 4 per cent., were suffering from "excludable" diseases, the commonest being trachoma.

Children examined ...	10,237		
Normal	3,710	...	36 per cent.
With defects	6,527	...	59 ,,
Excludable diseases...	500	...	4 ,,
Trachoma	310	...	3 ,,
Acute conjunctivitis	60	...	0·5 ,,
Scabies	80	...	0·7 ,,
Others	50	...	0·4 ,,
With non-excludable diseases ...	6,027	...	—
Dental caries	4,240	...	41 ,,
Enlarged tonsils	593	...	5 ,,
Miscellaneous diseases	1,340	...	13 ,,

An educative campaign against dental defects is of prime importance, as also is one against trachoma.

Gonzalez (Andelfo). **Estudio de las condiciones sanitarias de los niños en las escuelas de Bogotá.**—*Repert. Med. y Cirug.* Bogotá. 1924. Nov. Vol. 16. No. 2. (No. 182). pp. 82–100.

In this paper are recorded the results of examination on the usual lines of the physical condition of 800 male and 360 female school

children expressed largely in the form of Tables; but as the percentages are worked for single years in which the numbers are small these figures are not a very reliable gauge. One is surprised to find that just under half of the boys and over half of the girls harboured *Pediculus capitis*. The general state of nutrition was below the standard in nearly 50 per cent.; this is ascribed to the poverty of the parents.

H. Harold Scott.

INDUSTRIAL HYGIENE.

Robertson (D. G.). **Industrial Medical Service.**—*Med. Jl. Australia.* 1925. Mar. 28. 12th Year. Vol. 1. No. 13. pp. 303–309. With 5 text figs.

In increasing numbers Australian industrial organizations are instituting systems of medical service for their employees, and it is essential that the medical profession and the employers interested should set before themselves clearly what a medical service should do and how this work should be undertaken. A questionnaire on the subject was addressed in November, 1924, by the Commonwealth Department of Health to the larger employers of labour throughout Australia, with the result that apparently, at the present time, forty medical men (seven full-time and thirty three part-time) are engaged on this class of work. In addition to medical men, at 23 establishments the full-time services of qualified nurses are engaged, at 10 others untrained nurses are employed, and 42 other companies report that persons qualified in first aid are employed.

An analysis of the duties required from the medical officers indicates strongly that the main purpose of an industrial health service, that is to say, the prevention of sickness, accidents and inefficiency amongst the employees, is lost sight of by many of the employers who have instituted the services.

The objects of an industrial health service are to improve the working conditions in the industry, to supervise the health of the workers, and to educate them in personal hygiene. These objects may be attained by the following, which are the duties of an Industrial Medical Practitioner.

Hygienic Supervision of the Plant.

A close supervision should be exercised over all the working conditions. Every part of the establishment should be regularly inspected, particular regard being paid to the detection of anything likely to exercise an adverse influence on the health of the workers. Questions of ventilation, temperature, humidity, floor space per employee, the presence of harmful dusts, gases and fumes may require adjustment. Individual occupations should be studied as regards their monotony, concentration required and speed. The drinking water supply, adequacy of toilet, washing, and locker facilities should be noted.

Vocational Placement of Workers.

The physical and temperamental requirements of the various occupations should be studied. By so doing the particular occupation for which any individual is suitable and the converse may be brought

to light. Mr. Henry Ford carried out extensive enquiry on these lines in his motor car factories. The result obtained was that there were 7,882 different kinds of jobs in the factory, of which 949 were classified as heavy work requiring practically perfect physique, 3,338 needed ordinary physical development and strength, and the remaining 3,595 jobs were proved to require no physical exertion and could be performed by the slightest and weakest of men. The lightest jobs were further classified, with the following results: 670 could be filled by legless men, 2,637 by one-legged men, 2 by armless men, 715 by one-armed men, and 10 by the blind. Therefore, out of 7,882 kinds of employment, 4,034, although some of them required strength, did not require full capacity. In other words, developed industry can provide wage work for a higher average of standard men than are ordinarily included in any normal community.

Physical Examination of Workers.

Employees may be examined on the following occasions and for the following reasons:—

1. *Prior to employment.*—Apart from Governmental or semi-Governmental departments and municipal undertakings it is not the custom in Australia for employers to require a physical examination before employment. When such examinations are required, however, the point is impressed that the object of them should be to determine the particular occupation for which the examinee is suitable rather than for the elimination of the physically unfit.

The Conference Board of Industrial Physicians of America recommend that the only applicants who should be rejected are those who are likely to be dangerous to themselves, to others, or to property.

2. *After absences due to sickness or injury not under observation.*—By such examination diseases may be found in their incipiency when the prospects of successful treatment and cure are most favourable.

3. *When reporting sick during working hours.*—Where a full-time physician or nurse is employed it should be a rule that no employee leaves the works without having first consulted the physician or nurse.

4. *Apparent unsuitability for position occupied.*—In America, the Drayton Cash Register Company requires the foremen to place the employees under them into different grades according to the degree of satisfaction given in the performance of duties. Those in the lowest grades are sent for medical examination, and the medical director has placed it on record that physical defects responsible for the unsatisfactory performance of duties are found with extraordinary frequency. Appropriate treatment or the placing of workers in occupations more suited to their physical condition or mental capacity may produce a large percentage of useful workers from these previous misfits.

5. *As a guard against communicable disease.*—The object of such examination is evident; it is particularly necessary in the case of those handling food.

6. *In occupations dangerous to health.*—In Western Australia the law requires periodical examination of persons engaged in factories where lead or any poisonous compound of lead is used. Such examinations are not only of value in the detection of incipient cases of poisoning, but attention is directed to the particular process causing trouble, and employers are forced in self defence to take the necessary measures to remove or minimise these causes.

7. *Periodical health stock taking examinations.*—Although desirable, time seldom permits that every employee be periodically re-examined. It is a good rule, however, that the senior executive officers in the establishment be examined every twelve months, and that others in whom previous examinations have disclosed defects be seen.

Health Maintenance.

Industrial medical men should endeavour to instruct workers in personal hygiene by means of lectures, personal talks, articles in shop papers, and so forth. Questions of proper clothing, food, recreation, exercise, rest, prevention of communicable diseases, etc., should be dealt with. Attention should also be directed to the procurement and operation of facilities for rest, recreation and exercise to particular groups of workers requiring those benefits and the means of application should be indicated.

There are many influential factors causing ill-health that cannot be controlled within the place of work.

Surgical and Medical Treatment.

Treatment should be confined to first aid in the case of injuries sufficiently severe to cause absence from work, but all other injuries, whether sustained at work or not, should be treated until recovery. The prompt reporting of all injuries, no matter how trivial, is highly important, as by proper and early treatment numerous cases of septic poisoning are prevented.

Where the medical officer is only on part-time employment he should, if a nurse is engaged, indicate the general lines of treatment, and supervise it at the time of his visits. If no nurse is arranged for, he should ascertain that adequate first aid facilities are available.

Medical treatment should be afforded for all minor ailments, but the more severe conditions should be referred to the family physician, the case being, however, kept under observation. Where no nurse is engaged and the medical man is part-time, arrangements should be made for the attendance of employees desiring medical advice at certain definite times. Where a nurse is available she should be instructed to refer to the medical officer all whom she considers require medical attention. Where the occupation subjects the workers to risk from definite poison, as, for instance, in the lead industry, it is desirable that a stock of prophylactic medicines be maintained and that the employees be encouraged to take them regularly under supervision.

General Duties.

Where sociological departments exist the medical man should closely co-operate with them.

Sometimes workers are unable to obtain adequate medical, nursing or dental attention for themselves or their dependents, and the doctor, with his knowledge of medical men, hospitals, dentists, clinics and nursing societies, may be able to render valuable assistance.

Instruction of Medical Personnel.

Any nurses or first aid attendants engaged will need to be instructed in all matters connected with their duties. Classes for employees are also desirable and lectures on first aid should be given. Instructive pamphlets may be issued, especially detailing the necessary precautions against risks that are unavoidable, such, for instance, as occurs to workers in lead industries.

Compilation of Records.

Efficiency of the medical supervision is to be gauged by the amount of time lost through illness among the employees. Accurate records of the work performed and of the amounts of sickness and accidents are essentially valuable. Certain prescribed forms for the registration of records are prepared by the Statistician of the Commonwealth Department of Health; these are available on request to the Director-General of Health.

Duties of an Industrial Nurse.

In addition to duties in connection with the treatment of minor maladies and injuries under the supervision of the medical officer, the Industrial Nurse must exercise a general supervision over all matters affecting the health and well-being of the workers.

By visits to the various departments she should get to know the workers and seek to gain their confidence. The rest room or house ward should be entirely in her charge, for it is with girls attending these rooms that personal advice from the nurse is so valuable.

Under certain circumstances the nurse may, with advantage, give professional advice to employees absent from work through sickness, by means of home visiting. In such event, however, it is absolutely essential that any suspicion that she may be acting as a spy on the workers on behalf of the employer be quite out of the question.

An important duty is the keeping of records of persons treated and of the amount of sickness in the different departments.

Accommodation for Medical Department.

This will vary in accordance with the nature of the industry, workers employed, etc. Generally speaking, a surgery, consulting room, and a rest room will be found sufficient.

The surgery should be of sufficient size to permit of the maximum number of dressings being treated with speed and ease. A supply of hot and cold water should be available. Separate doors for entrance and for exit should be provided.

A consulting room is essential when physical examinations are made. It may also act as an office for the doctor and for the nurse.

A rest room furnished with couches and arm-chairs is desirable where women are employed. It should be a bright room, well lit and well ventilated. The nurse should keep a careful eye on all making use of the room.

Surgeries for the treatment of accidents have been provided in 54 establishments in Australia; in 24 others remedies are kept for medical treatment. In 10 establishments special rooms are provided furnished with one or more beds for the treatment of temporary indisposition, while in 46 others rest rooms are provided.

Educational Courses in Industrial Hygiene.

In the United States of America all medical schools providing courses in Public Health give 8 to 10 lectures on industrial hygiene and the more dangerous occupations.

At Harvard University special courses are arranged for medical practitioners who are interested in the subject. The following list details the subjects dealt with:—

(*a*) Industrial Medicine.
Industrial toxicology.
Clinical industrial medicine.
Industrial clinics.

(*b*) Industrial Medical Practice.
Industrial medical service ; including dispensary organisation, personnel, records, physical examinations, industrial psychiatry, health education.
(*c*) Factory Hygiene.
Ventilations, exhaust systems, humidity, dust determinations.
Illumination. Photometric determinations.
Sanitary installations, rest rooms, etc.
Industrial seating.
(*d*) Industrial Operation.
Industrial organization and methods.
(*e*) Labour Legislation.
Workmen's compensation laws : women and children in industry.
(*f*) Field Investigation.
Visits to representative industrial and mercantile establishments for study and observation.

MAITLAND (Charles Titterton). **Phosphorus Poisoning in Match Factories in China with Brief Observations on the General Conditions of Labour found. (Report to the Industrial Committee of the National Christian Council of China).**—Reprinted from *China Jl. of Sci. & Arts.* 1925. Feb. & Mar. Vol. 3. Nos. 2–3. 20 pp.

The methods adopted in the enquiry were : (1) Correspondence with physicians and others likely to be in possession of the facts in all known centres of match manufacture ; (2) personal investigation in Shanghai, Pekin, Tientsin, Chefoo and Tsingtao.

From the first source of information replies were received dealing with 28 cities representing 120 match factories. Of this number, 25 factories used white phosphorus, 19 red phosphorus, 4 both the white and the red ; from the rest no detail as to the kind of phosphorus used was given.

The conclusions arrived at are as follows :—

1. There is evidence of the occurrence of cases of phosphorus necrosis of the jaw amongst match workers in China. For reasons that are not clear, it appears that the number of cases is relatively few compared with Western experience.

2. There are grounds for belief that match manufacturers of China intend to discontinue the use of white phosphorus at the end of 1924 in pursuance of the prohibition of the Pekin Government.

3. In the writer's judgment, the general conditions of labour in match factories have worked far more ill to the health of the workers than poisoning by white phosphorus.

A description is given of the four Dangerous Processes :—

1. Mixing. This takes place in ill-ventilated workplaces, and practically no effort is made to prevent the inhalation of phosphorus vapour by the workers.

2. Dipping. No attention is given to ventilation, and in consequence the vapour is inhaled during the necessary process of spreading the phosp'horus paste preparatory to dipping the match sticks.

3. Drying. In certain cases the drying rooms, which are very hot and in which the atmosphere smells strongly of phosphorus, communicate with places in which other work is progressing without other means of ventilation.

4. Boxing. The filling is done by hand, with the result that they smell strongly of phosphorus after a period of work, and it is probable that an appreciable quantity of poison is ingested in eating with unwashed hands. The smell of phosphorus fills the air of the workroom for two reasons. This is partly because the dried matches still continue to give off vapour, and chiefly due to the accidental firing of matches by friction. This latter disengages heavy fumes of the oxides of phosphorus, with which the whole atmosphere of the room may be hazy.

In the boxing departments child labour is common, many children of from 5 to 6 years of age being employed ; they fill the boxes by hand with remarkable speed.

REPORTS AND VITAL STATISTICS.

NIGERIA. **Annual Medical and Sanitary Report, for the Year 1923.** [ALEXANDER (D.), Director of Med. and San. Service.] 45 pp. 1924. Lagos : Govt. Printer.

Amongst items of general interest in this Report note may be made of the following :—

Screening of houses against mosquitoes has been practically given up altogether, mainly on account of expense, but also partly because many occupants of completely screened houses complained of the diminished ventilation.

Owing to the rapid deterioration of vaccine-lymph when removed from cold storage, experiments were carried out to ascertain how the activity might best be preserved whilst in transit to out-stations, and whilst being used.

(1) The lymph, on receipt from England in steamer cold storage, is kept in cold storage at Lagos until issued for use in Lagos, when it is placed in a small cylindrical tin box, which is then wrapped up in cotton wool, placed in a wire bacteriological test-tube basket with a handle for hand transport. The whole is dipped in water occasionally to keep the cotton wool moist.

(2) Lymph for Ibadan and Kaduna was transported in an ice box by railway and issued for use as above described.

(3) For Kano and Katsina, the lymph was sent in the moist baskets from Kaduno to Kano by rail and to Katsina by runner, instructions being given to the runner to wet the cotton wool on each available occasion during the journey, and to hang the basket in the shade and, if possible, in a breeze during the rest periods.

(4) Vaccinators carried their supply of lymph in similar moist baskets.

(5) After the day's work the baskets were hung up in a shady place until required next day.

(6) All vaccinations were done in the shade.

(7) A group of vaccinations were carried out with the same batch of lymph at intervals of 2, 3, 6 and 10 days where possible, that is to say, a number was done :—

(*a*) At intervals of 2 days.—1st, 3rd, 5th, 7th and 9th days.
(*b*) ,, ,, 3 ,, 12th to 24th day.
(*c*) ,, ,, 6 ,, 20th to 54th day.
(*d*) ,, ,, 10 ,, 64th to 84th day.

(8) As frequently a considerable number of those vaccinated cannot be found for inspection the percentage of success was calculated as a percentage of those actually inspected.

Where these baskets can be effectively used the result is an appreciable increase in the success rate, especially in the Northern areas, where the air is much drier. The general success rate in the Northern Provinces has risen from 32 per cent. in 1922 to nearly 53 per cent. in 1923, although the new conditions only operated in a few of the more important centres. In the Southern Provinces the results have not shown such a noticeable improvement. The question of a local vaccine institute has been under consideration, but for financial reasons had to be postponed.

Worm infestation is exceedingly common among the indigenous population, though apparently but little inconvenience seems to be caused in those affected. Ascaris infection is almost universal. Hookworm, according to different observers, ranges from 30 per cent. to 90 per cent. ; as a rule, infestation is light among the peoples where food conditions are good. No hookworm campaign has been undertaken, and the sole measure against this widespread infection is such sanitary improvements as can be introduced through the Native Administrations, such as the Salga system (deep cess-pit) which has replaced the general use of a piece of " bush " ground as a latrine in certain of the towns.

Sierra Leone. **Annual Medical and Sanitary Report for the Year 1923.** [May (H. O'Hara), Acting Director, Med. & San. Services.] —88 pp. With 2 maps & 49 figs. 1924. Freetown : Govt. Printing Office.

The general health of both European and African officials was not so satisfactory as during 1922, although Freetown remained free from epidemics. Tuberculosis, especially amongst the Creoles, dysentery and venereal diseases all show a steady increase in the number treated. The death-rate increased from 26·3 in 1922 to 30 per 1,000 in the following year, and there seem to be no exact reasons for this, beyond the fact that there was a considerable increase in the number of deaths under three years. The infant mortality rate was 437 per 1,000 during the first year, but nearly half of these deaths occurred in the first month of life. The registration of births is still very incomplete and vital statistics for the Protectorate are not available, as registration of both births and deaths is permissive, and very few are registered.

The usual tables are given. It is noted that 474 persons were fined for having mosquito larvae on their premises.

There is an interesting report on the health of prisoners in Freetown gaol during the years 1913 to 1922 inclusive. The majority of all fatal cases among prisoners are admitted to hospital during the rainy season, and this seems to be correlated with the incidence of beriberi, the majority of the cases of this disease also being admitted during the season. The occupation of tailor definitely predisposes to fatal disease in Freetown Gaol, for of the total number of deaths during 1913 to 1922, namely, 213, no less than 72 (33 per cent.) occurred among the members of this trade, although their daily average strength was only about 15 per cent. of the total number of prisoners. The same predisposition is also shown in the case of beriberi. The higher death rate among the convicts is said to be due to this disease and

recommendations are put forward with regard to diet and conditions of work, in order to improve their general health.

Ankylostoma was found in 65·9 per cent. of the prisoners. Betanaphthol grs. 40 (in powder) followed in 1 hour by Thymol grs. 30 and Mist. Alba 4 ozs. after 4 hours, was the most successful form of treatment, whilst eucalyptus was a failure. *Filaria bancrofti* was found in 14·3 per cent., and *F. perstans* in 3·4 per cent. of the prisoners. The successful treatment of two cases of leprosy by injections of chaulmoogra oil is described in detail.

Professor Blacklock and Dr. M. G. Thompson examined 100 rats collected in Freetown during January and February, 1923, and found the following number of fleas on them :—

Species and sex.	Total.	Number infested.	*X. brasiliensis.*	*X. cheopis.*
Black rat (male)	21	19	68	36
,, ,, (female)	41	30	74	75
Brown rat (male)	17	15	185	87
,, ,, (female)	21	19	92	37
Total	100	83	419	235

In addition to Xenopsylla, three examples of *Ctenocephalus canis* were found on the rats.

The main interest of the report, however, lies in Professor Blacklock's account of his investigation into the prevalence of Goitre in the Protectorate of Sierra Leone, undertaken during the months of December, 1923, and January and February, 1924.

Beriberi. Experiments on fowls were undertaken to show what relative influence various factors exerted in the production of beriberi in the prison population. It was found that the rice supplied to the prison did not produce signs of polyneuritis after three months. When the water in which the rice had been boiled was discarded, evidence of definite effects was obtained and this effect was increased with prolonged cooking. Pounding the rice also had a very harmful effect, and is to be avoided. The presence or absence of sunlight seems to have no effect on the development of polyneuritis in fowls. Exercise, on the other hand, seems to produce very definite effects on fowls fed on a vitamin-deficient diet. In the first experiment all fowls deprived of exercise were dead within 17 days, whilst of those having free movements none died in less than 31 days. Of five fowls fed on polished rice and deprived of exercise, none lived longer than 26 days ; whilst of another five similarly fed, all lived 38 days or longer when allowed free exercise.

This important observation shows that in any occupation which involves a sedentary habit, such as tailoring, mat-weaving, etc., any vitamin deficiency in the diet renders the person particularly liable to acquire beriberi.

Finally, mention should be made of the large number of excellent figures illustrating the whole report, amongst which those showing surface drains before and after canalization are of especial interest.

E. Hindle.

Gold Coast. **Report on the Medical Department for the Period April, 1923-March, 1924.** [O'Dea (M. E.), Director, Med. and San. Services.]—49 pp. Accra : Govt. Printing Dept.

The report contains the usual account of health conditions and, as an appendix, the annual report of the Medical Research Institute

for the year 1923-24, by W. A. YOUNG, Acting Director, from which the following are abstracted :—

An inspection was made at Akuse (north from Addah) to Seccondee, Takoradi, Tarquah, and up to Coomassie via Dunkwa ; the type of country varies from big rain forest to orchard bush as one gets from the Colony to the Northern Territories. The species of tsetse-flies found present were *palpalis*, *longipalpis* and *tachinoides*.

It was noted that the state, as regards the tsetse in the part of Ashanti visited, was identical with that described by KINGHORN in the year 1910 (*Sleeping Sickness Bulletin*, Vols. 2 & 3). That is to say, the intensity of the fly has shown no increase during the past fourteen years, and, when the type of country and the climatic conditions are examined, it is seen that the tsetse fly just holds its own against the natural conditions, and no more. The reasons are considered to be :—

The banks of the rivers visited, *i.e.*, the Black Volta, the White, and the Volta proper, are thickly clothed with bush, which in most places overhangs the rivers. This means little room for movement of the flies and unsuitable places for game to drink. Here and there suitable places are found and here *palpalis* is present, and where there is high shade *tachinoides* also exists. *Longipalpis*, though not so dependent on water, is not found, however, where there is no water in a large radius.

The result is that on some treks of twenty miles, where no water was to be had, no *longipalpis* was seen. If, however, one stream was encountered, it was safe to expect *longipalpis* on that road, even though some miles from water.

During the dry season the orchard bush is barren of grass and leaves and devoid of water ; consequently, there is no game and no flies are encountered. With the beginning of the rains and the forming of streams, the game spreads and the fly would appear to follow. These rivers, in the rains, rise many feet, and so a large number of pupae must be drowned.

The writer is under the impression that, as long as every human case of sleeping sickness could be isolated and cured, the fly is of no importance so far as human beings are concerned, beyond their biting irritation. Sporadic cases of the disease may, and probably do, get their infection from animals infected with *T. gambiense*, but anything of an epidemic nature that would occur here would undoubtedly be due to infection from man to man either directly or indirectly. Direct infection is a possibility, as trypanosomes taken up in the proboscis of a tsetse have been observed to be alive in the proboscis after half an hour.

As regards relapsing fever, the following conclusions are detailed :—

1. This first recorded outbreak of relapsing fever in British West Africa is due to a spironema conveyed by lice.

2. As regards inoculation experiments, monkeys and black and white rats became infected with the strain, but do not relapse ; guineapigs and rabbits are refractory, whilst the pouched rat becomes infected and relapses.

3. The vectors of the organism in the present epidemic and the inoculation experiments suggest that the parasite is not *Sp. duttoni*, but corresponds more closely to *Sp. recurrentis* (vel *obermeieri*), or a related strain.

4. Novarsenobillon is a specific in the treatment of the disease.

5. Immunity does not appear to be lasting or complete in cases treated with Novarsenobillon.

The kidneys of 100 rats were examined for the presence of *Leptospira icterohaemorrhagiae,* with negative results. The series included 75 *decumanus,* 11 *M. rattus* and 14 *Cricetomys gambianus.*

In the Report of the Analytical Chemist it is noted that no specimen of "native medicine" yet received with a "history" attached to it has been found to contain recognizable principles of either toxic or therapeutic value, toxicity tests being supplemented by experiment with animals.

SIMPSON (William). **Report to the Secretary of State for the Colonies on the Sanitary Condition of the Mines and Mining Villages in the Gold Coast Colony and Ashanti.**—32 pp. With 8 folding plans & 56 figs on 26 plates. 1925. Published by the Crown Agents for the Colonies.

The terms of reference were :—

"(1) To examine and to report to the Secretary of State on the sanitary condition of the Mines and Mining Villages in the Gold Coast Colony and Ashanti.

"(2) To enquire into and to report to the Secretary of State on the causes of the high mortality among the Native labourers, employed on the mines, particularly those recruited from the Northern Territories of the Gold Coast.

"(3) To report as to the remedial measures to be taken in these matters."

Until October, 1921, all the mines employed local labour from the surrounding villages ; since then, owing to scarcity in labour, a scheme of organized recruiting to supplement the local labour was originated. The labour by this system is principally derived from the Northern Territories of the Gold Coast. The period of engagement is for one year.

When this system of recruiting was started it was not realized that medical inspection in the Northern Territories was necessary to prevent unfit recruits being sent, nor was it thought essential to have some certificate of identification as a precaution that men who had been recruited were not changed on their way down country for others who were not fit.

The high death rate of the miners was partly due to the above absence of efficient organization, but among the additional causes the most important was the conditions favouring the presence of ankylostomiasis both in the mines themselves and in the mining villages. Unsatisfactory housing conditions in certain of the compounds, and in other locations a polluted and insufficient water supply and inadequate medical arrangements were contributory causes.

Death rates per 1,000 from April, 1923, to March, 1924, were as follows :—

	Mines.		
	Abbontiakoon.	Taquah and Abosso.	Prestea Block A.
All native labour	36·17	49·89	28·12
Northern Territory labourers	65·73	99·85	25·64

It is noted that the shortage of medical officers has a serious effect upon the health and economic interests of the country ; the scheme of an Auxiliary West African Medical Service locally trained is now being pushed forward.

"The remedial measures for the high death-rate in the mines resolve themselves into :—

"(*a*) Recruitment of healthy men for the mines.

"(*b*) Treatment of people in the mines and mine villages infected with ankylostomiasis.

"(*c*) Removal of insanitary conditions in the mines and mine villages.

"(*d*) Provision of adequate medical arrangements in Abbontiakoon, Taquah, Abosso and Nsuta Mines."

The recommendations made to ensure the above remedial measures are contained under twenty-two headings. They are for the most part those applicable to the prevention of ankylostomiasis, the proper examination of prospective employees and matters affecting the housing conditions, general sanitation and medical arrangements.

The bulk of the report is occupied with details relating to the individual mines and mining villages.

SIMPSON (William). **Report to the Secretary of State for the Colonies on the Outbreak of Plague in the Gold Coast Colony and Ashanti.**—17 pp. With 23 figs on 12 plates. 1925. Published by the Crown Agents for the Colonies.

In view of the position of the Gold Coast and its trade relations with countries infected with plague, its comparative freedom from the disease during many years may be considered fortunate. Some of the immunity of the Gold Coast during these years may be attributable to its not possessing any port with a harbour which admits vessels alongside its docks.

The first recognized cases of plague in Secondee were on 12th March, 1924 ; they occurred among Kroomen connected with shipping in the port. The disease spread in the area of the town chiefly occupied by these labourers, with the result that between March 12th and April 30th, 1924, 96 cases of plague (91 bubonic and 5 pneumonic) with 68 deaths, occurred. There was no evidence of an epizootic of plague amongst rats having occurred before the human cases. Inquiry resulted in the belief that sporadic cases of the disease had been present in Secondee before those recognized on March 12th.

In spite of precautionary measures against the spread of the infection, plague was reported at Coomassie by March 31st. Between this date and August 4th, 124 cases, with 110 deaths, were discovered.

By April 30th the disease appeared to have abated in Secondee, but on July 1st a recrudescence was evident, and between then and the 18th of the month, 24 deaths from pneumonic plague were discovered. This second outbreak was followed by infection of two villages along the coast line.

The conditions which render Secondee vulnerable to epidemic disease are given as :—

Conditions in the Port.

(1) Secondee is at present the chief gateway to the interior of the

Gold Coast, and as such, its trading relations with Europe, America, and the different Colonies on the West Coast are considerable.

(2) There is no assistant medical officer specially deputed for duties in the port.

(3) There is no expert staff to carry on work in the laboratory for research and diagnosis and acting as sentinels against the importation and lodgement of disease.

Conditions in the Town.

(4) The homes of the Kroomen labourers who are intimately associated with the work of shipping and port are overcrowded and insanitary.

(5) The general housing condition of the town, especially in the congested areas, is most unsatisfactory.

(6) The method of disposal of refuse is bad.

(7) The headings in the register of deaths are defective and consequently fail to furnish early and valuable information to the Health Department.

Secondee is by no means efficiently equipped to prevent the importation of disease and it is essential to prevent further reinforcements entering from outside. With this end in view the following recommendations were made :—

(*a*) A European assistant medical officer for the port to visit all ships having any connection with the shore by passengers, labourers, sailors or cargo. Independent inquiry should be made systematically and regularly as regards the health on board the numerous ships, especially intercolonial trading ships, that call at the port. These inquiries should be made in addition, and quite apart from any made by the quarantine officer.

(*b*) Under direction of the assistant medical officer the European sanitary inspector should make a regular inspection of the bond and transit sheds and their surroundings, also of the canoes, cargo tenders and boats, and collect any rats for bacteriological examination that may have been trapped or killed, or have died.

(*c*) The sanitary inspector should also supervise the disinfection of any cargo from a suspected ship, and there should be installed on the jetty in suitable buildings Clayton, or other disinfectors.

(*d*) There should be registration of the labourers who work in the docks with their addresses, and the register should include those who remain on cargo boats. In this way regular inspection of their houses on shore is facilitated and absences from work owing to sickness can be checked. All cases of sickness should be reported to the assistant health officer.

(*e*) The laboratories at Secondee should be re-opened and permanent use made of them for the examination of rats, squirrels and other animals likely to be affected with plague; for the preparation of vaccines; for special bacteriological and entomological research; for assistance to the medical personnel in the town for the investigation and diagnosis of disease. A sufficient expert staff requires to be appointed to carry out these duties.

As regards conditions in the town, it is noted that much progress in development has been made since the last occasion on which Sir William Simpson visited it in 1908, but very little has been accomplished in the solution of the housing problem for the general African community. The result is that congested areas and slums exist which should never have been allowed to arise.

Good housing is one of the best safeguards against plague. Plots for huts should not be less than 50 ft. by 50 ft.; plots for masonry houses for Africans should be 50 ft. by 75 or 100 ft., according to the size of house required. The sub-division of plots should not be allowed, and not more than one-half of the plot area should be covered by any hut or building.

Housing on the Gold Coast is a comparatively easy matter; there is no large population, the towns are small, and there is abundance of land available. There should be greater powers to deal with dilapidated and insanitary houses, basing compensation on the value of the swish and of the corrugated iron on the roof, and on the understanding that a new site in the new-planned-out areas is offered on which a new hut can be built according to plan.

Certain of the wooden huts erected in Secondee by the railway authorities for their European employees in the second class have not yet been vacated though originally they were only intended as temporary structures. They are not fit as dwellings for Europeans in a tropical climate; moreover, some are badly sited close to malarial areas.

The housing and sanitation of labour camps on the railway and other constructional works require special attention.

In connection with the docks there is a good opportunity of making the new township of Takoradi a model town.

The central market at Secondee is too small and is hemmed in by business houses; a new market on a fresh site and designed on modern principles is needed.

The present method of refuse disposal by dumping in the lagoon is not at all satisfactory. Incinerators should be installed for refuse disposal.

The drainage of the town should be considered by an experienced sanitary engineer.

The outbreak of plague at Coomassie was serious in that the town is the terminus of two lines of railway, and is the main market centre not only for Ashanti, but for the Northern Territories. The town generally was in an insanitary condition, overcrowded in certain areas with huts and houses of bad design. A defective method of death registration made it impossible to discover in what part of the town a suspicious increase of deaths is noticeable.

The recommendations made included the following:—

(1) That the Accra form "B" of Register of Deaths should be at once used, but with the addition of columns showing address in station, name and number of street, name of district, and occupation of deceased.

(2) A duplicate register should be kept at the burial ground by a reliable resident man, who should live in a hut built at the entrance of the ground. This man should be given a sufficient staff to keep the burial ground in a sanitary condition.

(3) That a sufficiency of temporary structures should be immediately provided for the strict medical supervision of contacts, so that *all* residents in the compound, and if need be, all residents in neighbouring compounds, may be removed, isolated and inoculated in the event of plague. While accommodated in these structures the compound houses should be dealt with.

(4) If the compound houses are not fit for the occupiers to return after 12 days, then they must go into temporary camp, such as now is

erected for people whose huts have been destroyed. They would be able to work during the day, returning to the camp at night.

(5) The infected compound should have all its rooms claytonized or disinfected with cyanide, the latter being carried out by a European. Adequate steps are necessary to ensure proper treatment during fumigation.

(6) There should be a house-to-house inspection of the whole town. The inspection of infected areas beginning on the outskirts and proceeding to the centre. The inspection should take note of all necessary matters in connection with plague, and records should be kept of the findings.

(7) Three more medical men and four more European sanitary inspectors are required to carry out the above recommendations.

(8) A plan of the town should be made showing the position and date of cases of the disease; the localities and dates of finding infected rats should also be noted.

(9) All food stores should be inspected and rats in them should be sent for examination.

(10) In order to be ready to evacuate an area which is badly infected, a camp should be prepared, either of bush huts or tents or both. This camp is in addition to those suggested in (3) and (4) above.

(11) It should be the duty of all medical men to report to the health authorities any suspicious case they may attend.

COLOMBO, MUNICIPALITY OF. **Report of the Medical Officer of Health for the Year 1923.** [ASERAPPA (C. V.), Acting M.O.H.]—pp. 50. With 9 charts and 4 maps. 1923. Colombo: Municipal Printing Office.

The report contains the usual account of the health conditions and general sanitary state of the city, and includes charts, maps and tabular statements. The health of the city, as gauged by the amount of sickness and mortality, was not satisfactory. The crude death-rate was 35·5, as against 31·1 per 1,000 in the preceding year, and 29·8, the average for the preceding 10 years. The rates are fallacious as they are calculated on a population figure very much below the real. At the time of the last census Colombo had not fully recovered from the effects of the war and a great part of the large immigrant population had not returned.

The reports of the City Bacteriologist, Dr. L. Fabian HIRST, which are annexed to the main report, will be found to be of general interest.

Investigations on the control of hookworm disease form the subject of one of these special reports, resulting from an outbreak of the disease occurring amongst a gang of coolies who had been engaged in clearing out the sludge from the sump at a sewage pumping station. Investigations were conducted on various aspects of the life of the worm, including egg output, egg hatching, larval growth and activities, and larval life.

Amongst the conclusions arrived at are the following:—

(*a*) The labour force engaged in clearing sumps and sewers are exposed to grave risk of contracting hookworm disease. The sumps of pumping stations should be emptied as far as possible by mechanical means. Coolies should not enter the sumps or sewers without adequate protection for their feet and hands.

(*b*) Hookworm larvae are capable of ascending a considerable distance through loose soils. Hookworm infected faeces cannot be buried in such soil without risk of infecting the surface of the ground.

(*c*) Hookworm larvae cultured in soils rich in organic matter can survive at least four months in typical Colombo soils.

(*d*) The sludge from the septic tanks can be safely sold as manure after being thoroughly sun-dried and kept in dry store for six months.

(*e*) The reconstruction carried out on the septic tanks has not only improved the effluent chemically and physically, but it has diminished the risk of hookworm larvae passing out with the effluent or sludge.

The second report of the City Bacteriologist, which is of general interest, concerns plague. It is clear that the distribution of *X. cheopis* within the city boundaries is correlated with the distribution of both human and rat plague, and with the storage of imported produce. Approximately 75 per cent. of the fleas caught on rats from the Customs premises and Government granaries are *X. cheopis*. A severe epizootic of plague occurred amongst these rats in the month of May. Where sporadic cases of plague, or temporary foci of cheopis, occur elsewhere outside the endemic zone, it usually transpires that grain or forage has recently been imported into the neighbourhood from the plague zone.

The indigenous flea is *X. astia*. Over 98 per cent. of the fleas in plague-free districts belong to this species.

In last year's report a suggestion was made that astia might be able to carry at up-country ranges of temperature, and a series of transmission experiments were in progress with the special object of testing the power of astia to transmit plague at temperatures below those prevalent in Colombo. The experiment had just been made (1924) of keeping infected fleas at a temperature of 70-75° F. in an ice box. A positive result was obtained with 1 out of 68 infected astia; 2 out of the 3 rats bitten by this blocked astia died of plague. All attempts to transmit the disease from rat to rat by means of *X. astia* under the most favourable climatic conditions met with in Colombo have been entirely negative. On the other hand, successful transmissions with *X. cheopis* have more than once been obtained.

It is now clear that cheopis is a much more efficient vector of plague than astia under conditions that are not specially favourable to the spread of the disease. A comparison of the results of the Bombay (Taylor and Chitre 1922-23) and Colombo experiments supports the conclusion that the power of cheopis to transmit plague is less affected by climatic conditions than astia.

It is interesting to note that F. W. Cragg, in a further report on his rat flea survey of India obtained a coefficient of correlation of 0·879, probable error 0·057, between cheopis and plague, for a group of Indian ports including Bombay, Karachi, Madras city, and Rangoon, but a coefficient of only 0·250, probable error 0·198, for the Punjab. This result is in accord with the suggestions with regard to the effect of climate upon astia.

The theory that cheopis has a special relation to plague and, consequently, that the species distribution of rat fleas has great practical importance is gaining ground in many quarters.

Air Ministry. **Report on the Health of the Royal Air Force for the Year 1923.** [Munro (D.), Director of Medical Services, R.A.F.]—pp. iv+71. With 4 charts. 1925. Feb. Air Publication 1103. London: H.M. Stationery Office. [Price 3s. 6d. net.]

This report does not need much comment from our standpoint. The Force abroad is distributed in the Mediterranean Littoral (Malta, Egypt, and Palestine), Iraq, and India. The main diseases affecting

the Force in these regions are sandfly fever, malaria and dysentery. Sandfly fever is prevalent in the summer and autumn (May or June to October, inclusive), but in India cases occurred in all months excepting February and December; the ratio of cases per 1,000 per annum in 1923 was, for the Mediterranean (Malta), 137·2, Egypt and Palestine, 97·6; for Iraq, 301·6; for India, 25·8. Malaria is particularly prevalent from June or July to November, inclusive; the ratio of cases per 1,000 per annum was, for the whole Mediterranean, 26·5; for Iraq, 151·2; for India, 202. Dysentery is distributed through the greater part of the year, but with increased incidence from May or June to November; the ratio of cases per 1,000 was, for the Mediterranean, 15·3; for Iraq, 30·6; for India, 17·9. In all regions together there were, during 1923, 20 cases of typhoid with 3 deaths, 6 cases of paratyphoid A, and 7 cases of paratyphoid B. There were 3 cases of heat-stroke—2 in Iraq and 1 in Transjordania—with 1 death.

There are laboratories abroad, at Ludd, Hinaidi, and Basrah, besides those at the R.A.F. Hospitals at home and the home Central Laboratory. At the last-named institution investigations were continued on *Phlebotomus papatasii* and sandfly fever; an opportunity occurred here of testing the susceptibility of *P. papatasii* to the infection of Oriental sore, and the experiments were negative.

A. A.

Fernós Isern (A.). **Mortalidad infantil en Puerto Rico.**—*Bol. Asoc. Med. de Puerto Rico.* 1925. Apr. Vol. 19. No. 148. pp. 26–31.

Infantile mortality in Porto Rico is very high. In 1923-24 the rate was 128 per 1,000 births, and this was lower than in any of the preceding five years. During 1923-24 there were 6,642 deaths in the first year of life, and of these, 2,217 were ascribed to gastro-intestinal disorders, 1,814 to marasmus, and 1,092 to respiratory conditions, including tuberculosis. The large number of gastro-intestinal disorders of infancy is ascribed to the prevalent idea that breast-feeding is insufficient for nutrition. Tetanus was accountable for 503 deaths, although expectant mothers and midwives are provided with "prophylactic packets." Inquiry showed that these were very rarely used. As large a proportion as 108·9 per 100,000 are registered as due to rickets. The author thinks that this is a grave error, and that under this term are included many cases of marasmus, inherited syphilis and tuberculosis.

The Health Department are making great efforts to overcome this huge mortality by establishing prenatal centres, infantile clinics, visiting nurses, and venereal and tuberculosis clinics.

H. Harold Scott.

Suzuki (T.). **Special Causes of Infant Mortality in Dairen.**—*Jl. Oriental Med.* 1924. Aug. Vol. 2. No. 3. pp. 239–245.

The statistics given in the article are the result of six years scientific research in the clinic of the author, dealing with over 35,000 cases relating to diseases widely distributed over Dairen and its suburbs. Of the above number of cases treated 1,775 died; of these 789 were children whose ages were under one year.

The general conclusions are as follows:—

1. The specific causes of infant mortality in Dairen are as follows:

Influenza, beriberi, enteritis, measles, broncho-pneumonia, whooping-cough.

2. The following five systems of diseases are the principal causes of infant mortality in Dairen: (*a*) General diseases; (*b*) digestive system; (*c*) respiratory system; (*d*) nervous system; (*e*) congenital debility.

3. Infantile mortality is highest in March. In autumn, infant deaths are fewest. In winter infant deaths are caused by influenza and broncho-pneumonia. In spring measles may be added to the above. At the end of spring enteritis begins, reaching its maximum in summertime, in which period whooping-cough and beriberi are added. Beriberi continues until early autumn and from then infant mortality declines.

4. As regards age incidence. During the first and second months of life infantile beriberi and pneumonia are most prevalent, and again in the tenth and eleventh months. During weaning infant enteritis and measles are most prevalent.

5. Specific causes of deaths in the newly-born are as detailed below in order of importance, but congenital debility is peculiar to these times. (*a*) Influenza and infantile beriberi; (*b*) congenital debility; (*c*) premature birth; (*d*) broncho-pneumonia; (*e*) encephalitis.

Émily. **Note au sujet de l'état sanitaire des contingents indigènes du corps d'armée colonial pendant l'année 1923.**—*Ann. de Méd. et de Pharm. Colon.* 1924. Sept.-Oct.-Nov.-Dec. Vol. 22. No. 3. pp. 377–395. With 2 figs.

This note apparently relates to colonial contingents serving in Europe in 1923. In a force of 8,230 Senegalese, 250 deaths occurred and 351 repatriations; of the deaths, 39·6 per cent. were from pulmonary affections, and 46 per cent. from tuberculosis, and of the repatriations 23·5 per cent. were for lung trouble and tuberculosis, and 53 per cent. for debility, pointing towards tuberculosis. In a force of 6,136 Malagasies the deaths were 120 and the repatriations 280; pulmonary affections accounted for 32·5 per cent., and tuberculosis for 33·35 per cent. of the deaths, and tuberculosis and pulmonary affections for 30 per cent., and debility with predisposition to tuberculosis for 52·5 per cent. of the repatriations. In a force of 3,368 Indo-Chinese the number of deaths was 48, and of repatriations 147; 18·75 per cent. of the deaths were from pulmonary affections, and 33·85 per cent. from tuberculosis; 34·7 per cent. of the repatriations were for tuberculosis and pulmonary complaints, and 43·55 per cent. for debility predisposing to tuberculosis. Next to the affections of the respiratory organs—which were, however, less numerous than in the previous year—came venereal diseases, gastro-intestinal diseases, and skin diseases. Epidemics of chickenpox and mumps occurred among all the contingents.

A. A.

MISCELLANEOUS.

Health. Melbourne. 1925. Mar. Vol. 3. No. 2. pp. 48–51. With 2 text figs. **The Commonwealth Health Laboratories. Standard Plan of the Laboratories.**

The object of these laboratories is to supply country centres which have no laboratory facilities with the necessary staff, equipment, and

buildings to enable the diagnostic, public health, and investigational work of the district to be carried out.

A "type plan" of the standard laboratories which have already been erected at a number of centres in Australia is here reproduced :—

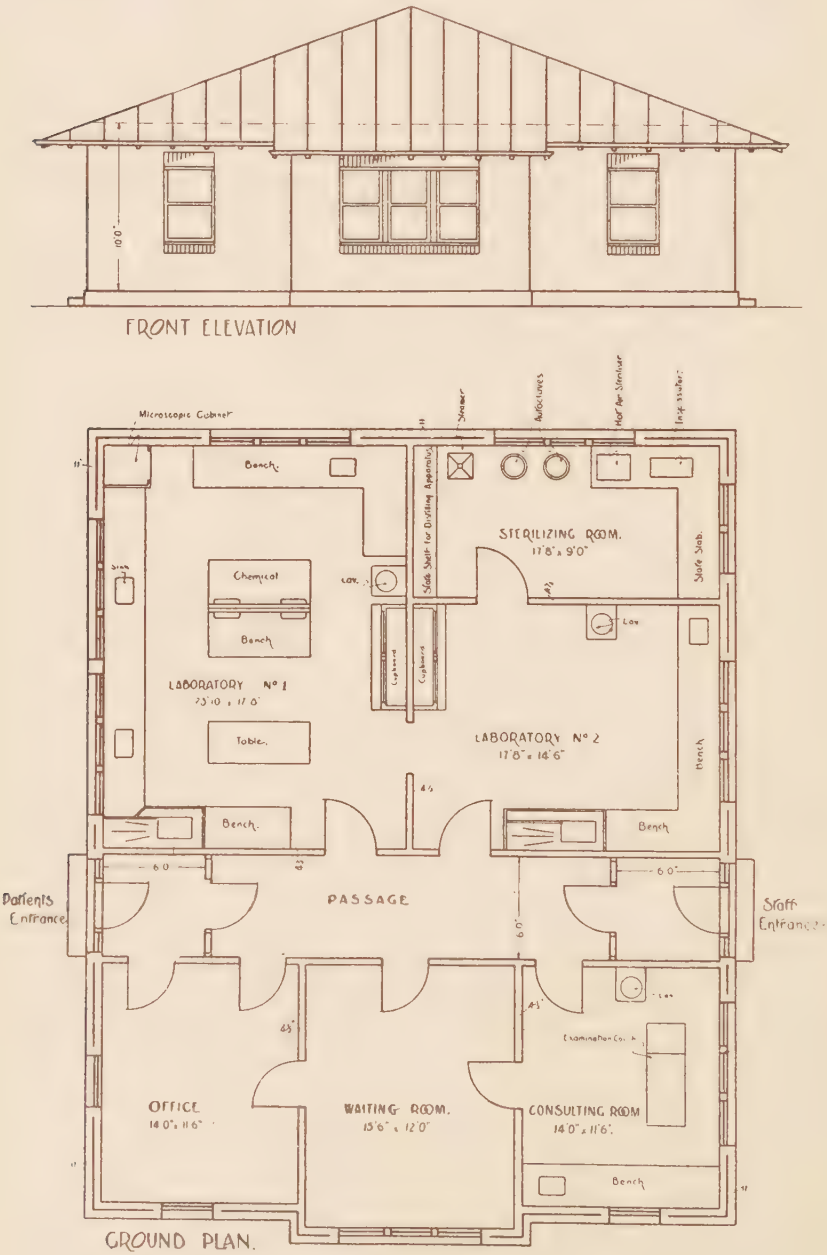


FIG. 46.—A "type plan" of the standard laboratories erected in a number of country centres in Australia.

[Reproduced from "*Health*," Melbourne.]

In connection with each laboratory provision is made for a main building which contains laboratory rooms and offices, and also for an animal house, the latter being an essential in modern bacteriological work. A " type plan " of an animal house is also reproduced :—

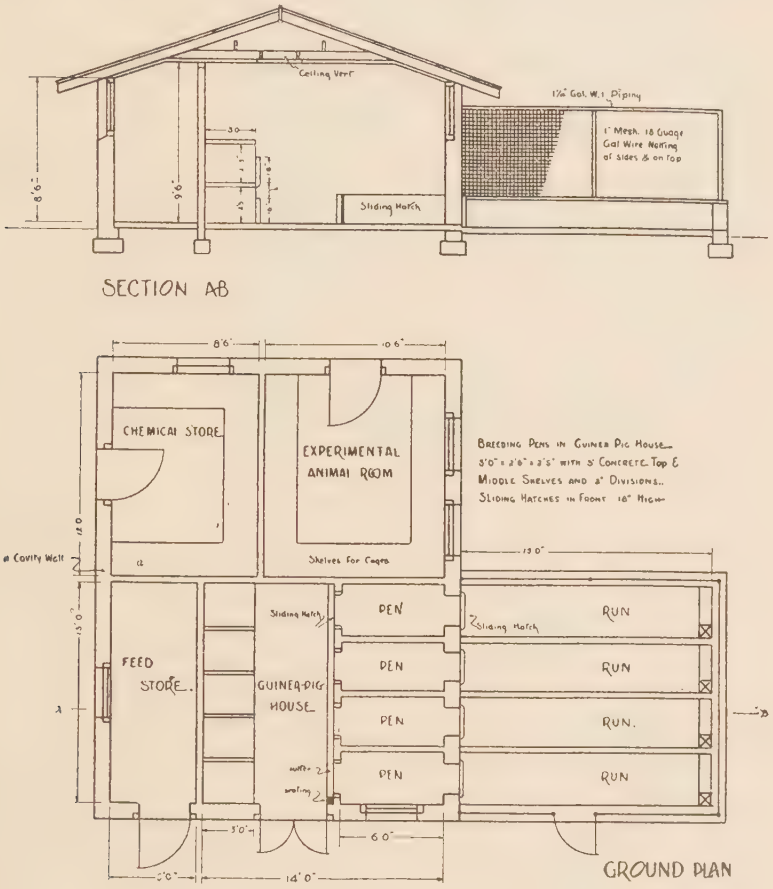

Ceiling Vent
1½" Gal. W.I. Piping
1" Mesh. 18 Gauge Gal Wire Netting of sides & on Top
Sliding Hatch
SECTION AB
CHEMICAL STORE
EXPERIMENTAL ANIMAL ROOM
Breeding Pens in Guinea Pig House— 3'0" x 2'6" x 2'3" with 3" Concrete Top & Middle Shelves and 2" Divisions.. Sliding Hatches in Front 18" High
Shelves for Cages
Cavity Wall
PEN
RUN
Sliding Hatch
FEED STORE
GUINEA-PIG HOUSE
GROUND PLAN

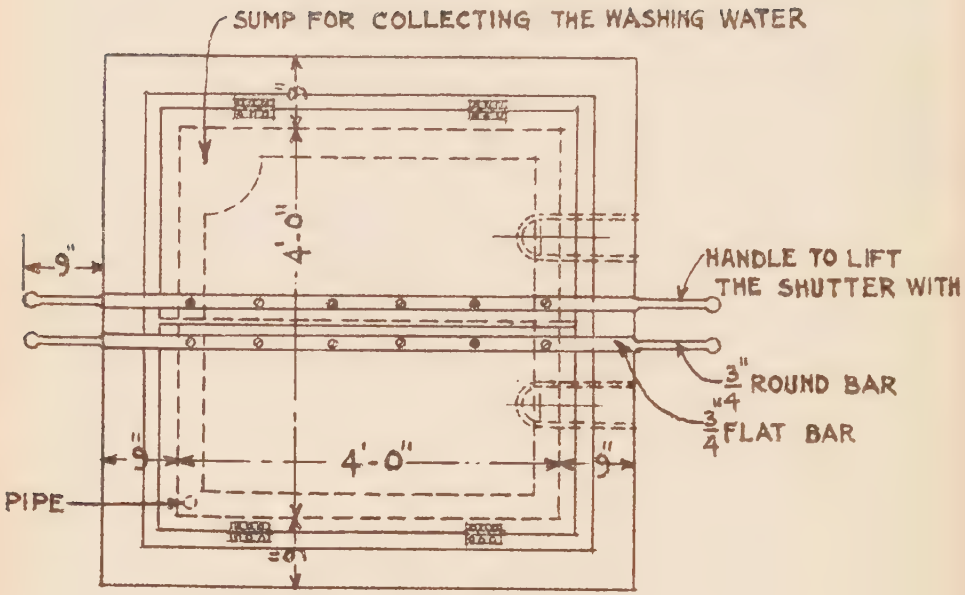
FIG. 47.—A " type plan " of the animal houses provided in connexion with the standard laboratories in Australia.

[Reproduced from " *Health*," Melbourne.]

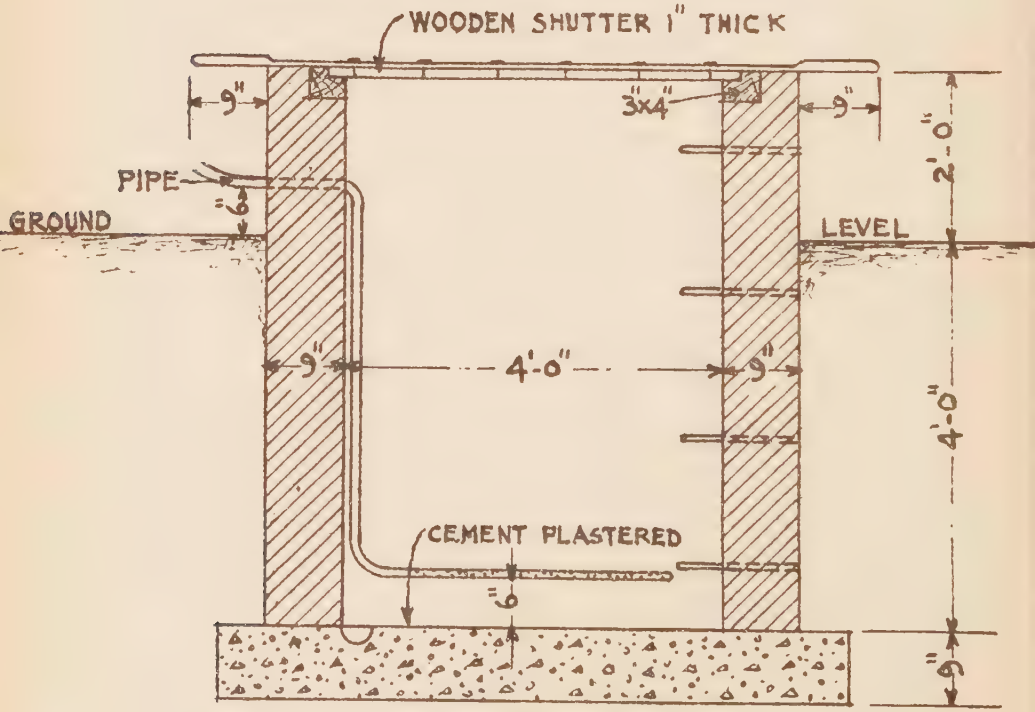
The dimensions and arrangements are illustrated on the plans. The points attended to are : (1) Good lighting, both natural and artificial ; ample window space with the bottoms of the windows on a level with the benches. (2) The provision of a microscope cabinet with a roll door and a " dead " black interior securing a minimum of eye strain, and uniform light. (3) Liberal provision of bench space, gas and water points are great conveniences, and provide for increase in working staff, if necessary.

MADRAS. Local Self-Government Dept. (Public Health) G.O. No. 1561, P.H., 30th Oct., 1924. 3 pp.—**Type-design.—Lethal Chamber for the Destruction of Dogs.**

" The chamber will be simply a cistern with masonry walls and cement-plastered concrete floor. The top will be covered with hinged



PLAN.



SECTION

FIG. 48.—Type design of a lethal chamber for the destruction of dogs.
[Madras Public Health Board type design No. 192.]

wooden shutters. The chamber will measure 4 ft. by 4 ft. and 6 ft. deep, of which 4 ft. will be below ground, and 2 ft. above.

"A lead pipe will be taken down one corner and then round the four sides at 6 in. above floor level. The portion of the pipe round the bottom of the tank will be perforated with $\frac{1}{4}$ in. diameter holes spaced about 1 in. apart.

"When the chamber is required for use, the lead pipe above ground will be connected to a cylinder of carbon-dioxide, and the gas turned on. The gas, being heavier than air, will flow down the pipe and escape into the pit through the perforations in the pipe. The level of gas in the pit should from time to time be tested by a lighted candle, and when the pit is full the supply of gas should be shut off and the pit allowed to remain undisturbed for about half an hour.

"The animals to be destroyed will, first of all, have a simple tape muzzle put on. They will then be led one at a time to the edge of the pit, one shutter will then be opened, and the animal lifted by putting the hands under the chest and raising on to the hind legs, which are then slipped over the edge, and the animal quickly lowered, a wide collar being used to prevent any injury to the neck. The shutter is then quickly closed. The animal will become unconscious in from 10 to 15 seconds and life will become extinct in from $2\frac{1}{2}$ to 3 minutes.

. . . . . .

"The inside of the pit should be plastered with cement and the bottom sloped to a sump in one corner to collect water when the pit is cleaned and washed. In ordinary use the bottom of the pit might be covered with 3 in. of dry sand to facilitate cleaning.

"The foot-rests may be omitted if a separate ladder is kept available for the purpose of entering the chamber for cleaning purposes.

"Care must be taken to see that the gas has all gone from the chamber before any person enters it to remove the dogs or for cleaning it."

MEGAW (J. W. D.). **On the Importance of keeping Cool.**—*Indian Med. Gaz.* 1924. Nov. Vol. 59. No. 11. pp. 572–575. With 2 diagrams.

The insidious wastage of human life and effort caused by high air temperature in the tropics, the author writes, has not yet been seriously studied. He suggests that one of the effects of prolonged exposure to heat is to beget a fatalistic attitude towards health and comfort. Apart from the electric fan little has been done to counteract the effect of excessive heat. The problem of keeping the air of a house cool is not easy; methods suitable for the dry heat of the Punjab are useless in the moist heat of Calcutta or Bombay. One can keep cool at night by taking advantage of the fact that the air outside is cooler than the air within, but in daytime in Calcutta or Bombay artificial air cooling is a necessity. An installation for this purpose has been in use with satisfactory results for three years at the Calcutta School of Tropical Medicine, and is here figured.

"The room is insulated, and is supplied with air which is passed over the coils of an ammonia refrigerating plant. The same fan is used for forcing the cool air into the room and for extracting the air from the room. Extra fresh air can be introduced into the circuit in any desired quantity to ensure good ventilation. The diagram shows the main features of the installation.

"The advantages of this system are:—

"(1) The air of the room can be maintained at a suitable temperature, irrespective of the climatic conditions.

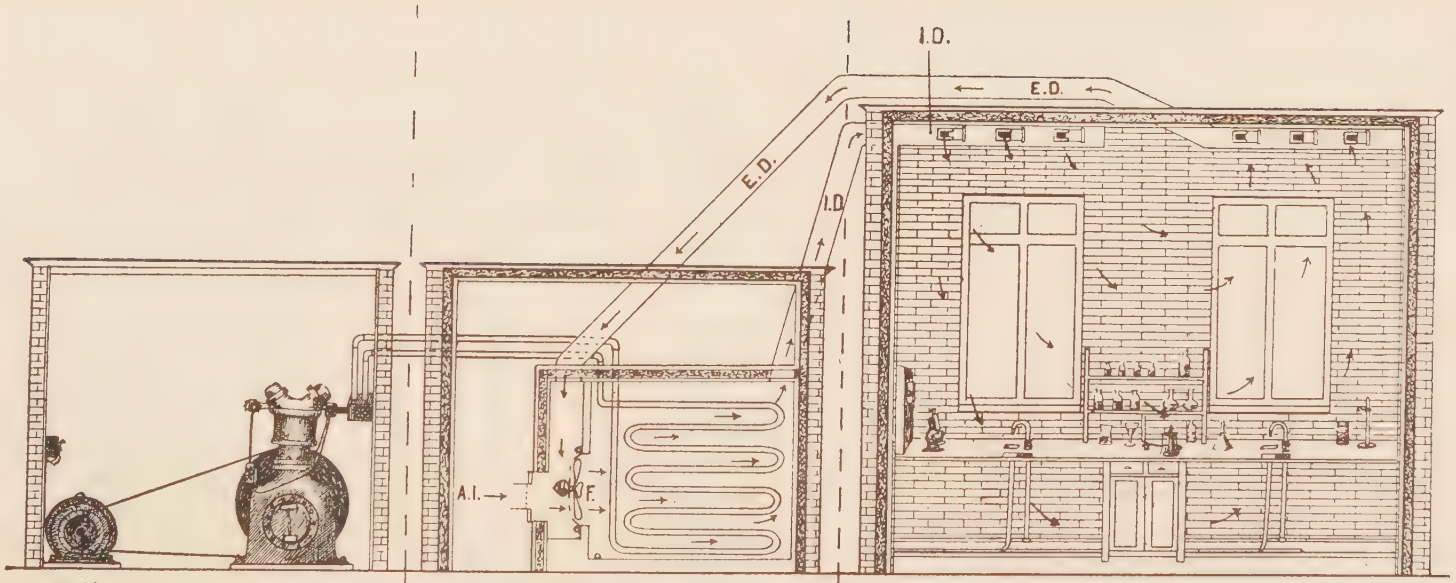

I.D.
E.D.
E.D.
I.D.
A.I.
F.
MOTOR AND AMMONIA COMPRESSOR.
AIR COOLING CHAMBER.
The arrows show the direction in which the air travels.
A.I.—Air inlet for extra fresh air. This air as well as the rest of the air in the circuit is propelled by the fan (F.)
COOL ROOM WITH INSULATED WALLS.
The arrows show the direction in which the air moves in the room.
The cool air enters by the openings in the Inlet duct (I.D.).
The used air which is warmer is drawn out by the openings of the Exhaust duct (E.D.).

FIG. 49.—Diagram of installation for artificial air cooling of a room at the Calcutta School of Tropical Medicine.
[Reproduced from the *Indian Medical Gazette*.]

" (2) The air of the room can be kept as dry as is desired.
" (3) The room is well lighted and well ventilated.
" (4) The air can easily be made dust proof and insect proof by filtering the inlet air over cotton wool."

In Calcutta the cost is not great because the system is connected with the cold storage plant. For suites of offices the cost of cooling for each person would work out at about 100 rupees a month. Such offices would be smaller than those of to-day, so that there would be a saving in space, and hence in cost of building. On the other hand, there would be increased mental efficiency, improved health, less need for expensive holidays, and a capacity for work after the normal time for retirement.

In the Punjab in the dry heat of the summer months advantage can be taken of the cooling caused by evaporation of water. The

Diagram II.

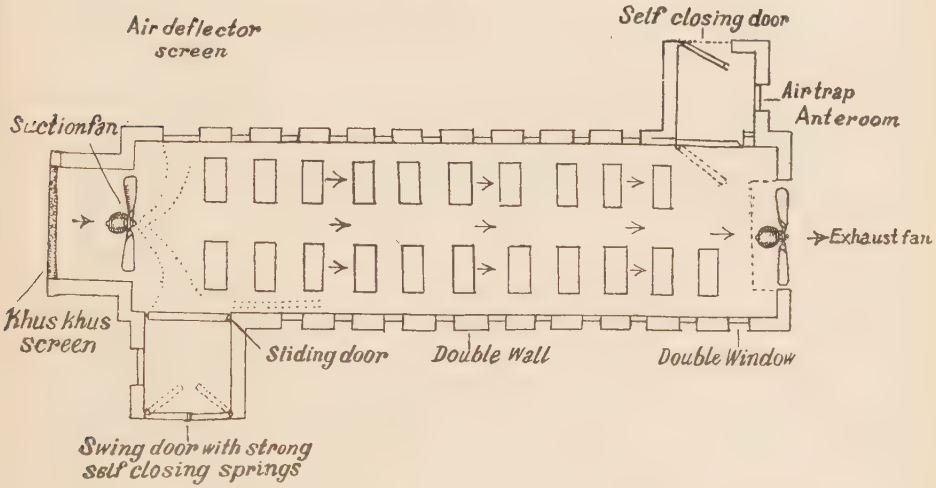


FIG. 50.—Diagram of hospital ward with damp khuskhus screen through which air is sucked by a large fan. An exhaust fan at the opposite end of the ward, working at the same speed, ensures a slowly moving column of cool air.

[Reproduced from the *Indian Medical Gazette.*]

diagram of a hospital ward explains itself. In the cold weather the windows could be opened wide, or the verandahs used. For railway trains the same system of cooling could be adopted ; the train's movement replacing the fan.

Other means of mitigating the " rigours of the tropics " are : (1) The underground room furnished with electric fans ; (2) the whitewashing of roofs and walls on the outside [see GRABHAM ; this *Bulletin*, Vol.18, p. 274] ; (3) double roofs with provision for air circulation between, the roofs extending well beyond the walls, which should also be hollow ; (4) improved construction of fans, to admit of their regulation in position and direction (fans are usually fixed so as to send down a current of hot air from the top of the room) ; (5) removable roofs for places of amusement.

A. G. B.

BOOK REVIEWS.

DUKES (Cuthbert) [M.D., M.Sc., D.P.H., Lecturer in Bacteriology, King's College for Women, Pathologist to St. Mark's Hospital, etc.] **The Bacteriology of Food.**—pp. x + 180. With 25 illustrations. 1925. London: H. K. Lewis & Co. Ltd. [Price 7s. 6d. net.]

This little book, designed to meet the special needs of students preparing for the final examination in Bacteriology for the degree of B.Sc., London University, not only worthily fulfils its purpose, but achieves a much greater usefulness, and may well find a place on the bookshelf of every specializing bacteriologist. The matter embraced within its small compass includes concise descriptions of the methods employed in the examination of water, milk and solid foods for the detection of bacteria which spoil the food or cause disease. The purification of drinking water, and the preservation of food by sterilizing, heating, canning, freezing, chilling, salting and desiccation are very fully dealt with. A lengthy section on milk forms one of the most valuable features. It discusses milk as a vehicle of disease and deals with the source and nature of micro-organisms, causing deterioration of milk. The author is strong in his condemnation of certain insanitary methods employed in the collection of milk, and puts forward many useful suggestions for the ensurance of a cleaner milk supply.

Passing from the micro-organisms of harmful import, the author gives a very interesting account of those bacteria and fungi of economic value which are used in the preparation of the different kinds of cheese and fermented milks, the leavening of bread and the fermentation of alcoholic beverages.

The important subject of "food poisoning" receives adequate consideration in the concluding chapter, and the work is completed by a very useful appendix on culture media and stains.

The book contains a great deal of important matter not found in text books on general bacteriology. It is written in a very lucid style, and the author has succeeded in rendering a highly technical subject not only intelligible, but interesting to the general reader, without introducing any of the defects of the "popular" work.

The illustrations are clear, and the quality of the typography, paper and binding reflects credit on the publishers.

J. T. Duncan.

ATKINSON (R. C. Everitt) [M.A., M.D., D.P.H., Commissioner of Public Health, Western Australia]. **Hygiene Jingles.**—48 pp. 1924. Adelaide: Hospital Electrical & Radium, Ltd., British Medical Association Building, Hindmarsh Square.

These "jingles" are meant "to fill a gap in the education of the young," their design being to combine, in one harmonious (if not melodious) scheme, instruction in the elementary principles of hygiene, and in the art of versification. Their author expresses no uncertain opinion as to their value: if a child "learn these jingles by heart and endeavour to practise what they preach, he will have an easier passage [through life] than ever the most beauteous gem of the classics can give him."

Regarding them from the hygiene standpoint their chief defect is that, although they have a semblance of being explanatory, so many of the things and terms of which the relations are explained must, to a child's mind, remain mere chimaeras. What, for instance, is a child to make of:—

> "And last, the triple Vitamins, we're told
> New principles in dieting unfold;
> For Science says that "A," and "B" and "C"
> Food factors are, required by you and me."

Their valuation as verse is beyond the scope of this *Bulletin*, and the following stanza is quoted for the sake of its last line, which shows that, notwithstanding his confident introductory statement, the author knows the weakness of his position and understands that knowledge is only *one* of many conditions that conduce to right action either in the ordinary affairs of life or in technical affairs, such as hygiene :—

" All babies need a lot of love and care,
Hence many die, who never really ought :
We lose these jewels, far beyond compare,
'Cos parents will not practise what they're taught."

Ay, there's the rub ; parents and others will not practise what they're taught, whether the preaching be to the accompaniment of the pealing organ and full-voiced choir, or of the exalted tambourine. The author has forgotten Dr. Isaac Watts's hymns.

A. Alcock.

St. John Ambulance. **Manual for the Use of Schools Training for the Mackenzie School Certificate in St. John Ambulance. Anatomy, Physiology, First Aid, Hygiene & Sanitation.** [Waters (H. G.), Chief Medical Officer, E.I. Railway.]—37 pp. with 1 folding fig. 1923. Allahabad : Pioneer Press. [Price 2 annas.]

St. John Ambulance. **Handbook for the Use of Teachers' Training Classes for the Mackenzie School Certificate in St. John Ambulance. Anatomy, Physiology, First Aid, Hygiene & Sanitation.** [Waters (H. G.), Chief Medical Officer, E.I. Railway.] 2nd ed. pp. vii+iii+113. With 26 text figs, 2 folding plans & 1 folding diagram. 1924. Allahabad : Pioneer Press. [Price 1 rupee.]

These books survey much the same ground, from different altitudes of vision. They appear to be sufficient for their purpose. In the " Handbook " for teachers one would prefer to see anatomy treated less as dry bones and more as anatomical topography, and physiology more as vital processes and purposes than as a descriptive catalogue of viscera. The section on hygiene and sanitation in the " Handbook " is remarkably good, though there is some deficiency in the important matter of food and diet.

A. Alcock.

TROPICAL DISEASES BUREAU.

SANITATION SUPPLEMENTS

OF THE

TROPICAL DISEASES BULLETIN.

APPLIED HYGIENE IN THE TROPICS.

By Lt.-Colonel G. E. F. Stammers, O.B.E., R.A.M.C. (retd.)

Supplement No. 3.] 1925. [October 30.

ERRATUM.

Sanitation Supplement No. 1, 1925, p. 64, lines 9 and 10. The birth rate and death rate for Mauritius for the year 1923 should read 36·8 and 28·5 *per mille* respectively, instead of *per cent.*

DISEASE PREVENTION.

Hope (E. W.). **Some Considerations in Regard to the International Aspect of Quarantine Regulations.**— *Jl. State Med.* 1924. Dec. Vol. 32. No. 12. pp. 551–555.

English Quarantine legislation is less restrictive than that of any other country, and it has been criticized as being due partly to the pressure of powerful commercial interests in the country and partly to a national tendency to a policy of *laisser faire.* Both of these criticisms can be refuted, for we do all that is necessary and practicable in the present state of knowledge to protect the public health of our own country from the importation of dangerous epidemic disease. The public health organization of the country is such that we are enabled when necessary to keep in touch with both passengers and crew which have been landed and have proceeded to the interior from abroad, thus avoiding the necessity for detention at our ports. It is not suggested that every country should adopt our procedure and no more, but it is strongly urged that quarantine restrictions should be exactly in proportion to the dangers that exist, in fact and not in theory. Quarantine legislation should also be protective and not aggressive.

The opinion is expressed that quarantine regulations should not be considered as a source of revenue ; the very most that should be derived in fees should no more than cover the cost of the service. In England ships of any nationality infected with plague, cholera or yellow fever

(K2746) Wt.P 157/183 1,625 10/25 H & Sp Gp 52

are dealt with at the expense of the country and not of the ship; no charges are made for medical inspection of vessels on arrival or for disinfection after infectious disease. In fact the Port Sanitary Authorities derive no revenue whatever directly from shipping, whether our own or that of a foreign country.

Bills of health appear to be almost an unnecessary legacy of the past. In these days of rapid transit it seems strange that a vessel should be required to carry a record of the state of health existing at the various ports of call, when other means equally reliable and far more rapid are available as sources of information. Information of the existence of dangerous epidemic disease in a port of departure is really required in advance of the arrival of the ship from that port. It would seem better to do as is done between the ports of our own country—viz., the last port of call should notify the next port of call that such and such an infectious disease has occurred on such and such a vessel.

Another problem is the fumigation of ships for rat destruction, which is a health measure of first importance. There is no doubt that many fumigations practised in various parts of the world can only be described as a farce. There are many points in favour of the periodical fumigation of ships at regular intervals of six months which is demanded by some countries, but it is a grape-shot method of attack, lacking the precision that modern scientific methods aim to achieve. In the United Kingdom, vessels are fumigated if there is the slightest suspicion of rodent plague on board; for the rest fumigation is ordered when there is evidence that the rats on board are numerous. In Liverpool the necessity for fumigation is based upon the reports of the rat-catchers and rat-searchers who are specially trained to examine ships and to report on the degree of rat infestation. This, combined with efforts to prevent the passage of rats from the ship to the shore, and the elimination of rat harbourage on the quays, gives very satisfactory results. Its success depends upon a skilled and trained staff which is trustworthy, and it is at least a more rational procedure than placing complete confidence in routine fumigation of all ships every six months, and of every ship from a plague infected port, regardless of any other consideration.

Lastly, in many countries vessels are not inspected except between sunrise and sunset, and so are detained if they arrive during the night. Nowadays when almost every ship is fitted with electric light it is always possible to obtain sufficient illumination for a thorough medical examination, and it appears unreasonable that a healthy ship should be detained until daylight before being medically inspected. In England, medical inspection is carried out by day or by night as soon as possible after arrival of the ship.

Lim (C. E.). **League of Nations Grading of Far Eastern Ports.**—*China Med. Jl.* 1925. May. Vol 39. No. 5. pp. 422–431.

The writer refers to the recent establishment of an Epidemiological Intelligence Bureau for the Far East and especially to the grading of ports.

So far as China is concerned it will at once be recognised that in most of the ports of the country there is scarcely any health organization capable of coping with the minimum requirements of the League as regards the prevention of the dissemination of disease.

Most of the health officers appointed to treaty ports have been busy local practitioners who cannot reasonably be expected to give their full attention to port sanitation. As a result, the Quarantine Service has, as a whole, been very backward and the available information as to its activities is extremely scanty.

Neither of the two largest ports, Hong Kong and Shanghai, can be graded as "first class" under the grading of the League. Hong Kong being a British Colony and under one administration can, without much difficulty, introduce the necessary improvements to make it a first class port. In the case of Shanghai, however, the proposition is different.

The city of Shanghai is made up of three distinct and independent administrative units : the International Settlement, the French Settlement, and the Chinese City. Each of these has an equally significant part as far as the health of the port is concerned.

The International Settlement has an efficient Public Health Department run on British lines and the French Settlement has a Sanitary Service in accordance with French practices, but in the Chinese City there is hardly any attempt at an organized health administration. The port health authority is vested in the Commissioner of Customs, who is assisted by a Port Health Officer stationed at Woosung. The latter in turn is dependent upon the health organizations of the city for his information as to the prevalence of infectious disease. Owing to the imperfect notification of infectious diseases the actual state of the city can only be guessed.

The writer proposes, therefore, in view of the fact that Shanghai, which is the fourth largest port in the world, should be capable of classification as a first class port, that a sanitary survey should be undertaken. The object of the survey will be to collect information, to advise the people as to their own sanitary condition, and to utilize the collected data as a basis for action towards such measures as will make Shanghai a port of the first class under the provisions suggested by the Health Committee of the League of Nations.

After reading the paper, the Conference Section on Public Health unanimously adopted a resolution embodying the above proposals.

CLEMOW (F. G.). **The Moslem Pilgrimages and the International Control of Disease.**—*Jl. State Med.* 1925. June. Vol. 33. No. 6. pp. 251–269. [5 refs.]

There are two great Muhammadan pilgrimages—the Haj, or annual pilgrimage to Mekka and Medina, and the Shiah pilgrimage to certain "holy cities" in Iraq and the adjoining countries. The Haj has long been recognised as offering a real and serious danger for the propagation of epidemic diseases.

Interesting details are given as to the customs peculiar to these great Muhammedan pilgrimages, and particulars are supplied of the extensive organizations provided for sanitary control. In many particulars these organizations have been disorganized or changed owing to the new conditions following on the War of 1914–18, and the point of the communication is to call attention to the great need for co-ordination by the different authorities in the several countries from which the pilgrims flock. That need has now received international recognition, and it has been proposed to the Health Committee of the League of Nations that it should be met by the formation of some

Co-ordinating Commission on which the principal countries and sanitary authorities concerned are represented. Its object should be to envisage each of the great pilgrimages (whether the Mussulman pilgrimage to the Hejaz and Iraq or the Christian pilgrimage to Jerusalem and elsewhere) as representing one great problem, or rather one group of problems, the solution of which is to be found in an orderly co-ordinated system of prophylactic measures in place of the piecemeal measures hitherto applied by individual countries mainly concerned with their own particular aspects of the question.

SCHAEFFER (H. F.). **De la ventilation à bord des navires de commerce pour l'aération et la lutte contre la chaleur et l'humidité.**—*Rev. d'Hygiène.* 1925. May. Vol. 47. No. 5. pp. 435–453. With 1 text fig.

The conclusions of the writer on the ventilation of ships are summarized as follows :—

1. *In the stoke-hold and in the engine room.*

In the former better use should be made of the draught of the funnel-casing by bringing down the screen in the stoke-hold to a lower level, to just above the height of an average man.

In the engine room it is advantageous :—

(*a*) To instal the sky-lights in such a manner that they may open vertically. If necessary the hatch may be surmounted by a windmill in order to facilitate as much as possible the removal of heated air.

(*b*) To avoid any openings in the partitions of the well-room.

(*c*) Definitely to avoid the introduction to the well-room of windsails unless these are of at least 1 metre in diameter or unless their walls can be lined conveniently with insulating material.

(*d*) To replace a number of windsails by one of large dimensions situated external to the engine room which divides at its termination into branches introducing the fresh air at floor level.

2. *Occupied part of the ship.*

(*a*) To utilize natural ventilation by making use of currents from the engine room and the stoke-hold.

(*b*) The employment of compressed air for ventilation.

(*c*) To make use of the hot compressed air employed for firing.

(*d*) To ensure the cleanliness of berths by washing with abundance of water and their subsequent dryness by compressed air.

(*e*) Carefully to avoid dampness and to secure aeration.

VAN HASSELT (Th. L.). **The Sanitation of Baoe-Baoe, Capital of the Sub-Division Boeton (S.E. Celebes).** –*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1925. Pt. 1. pp. 72–85. With 5 text figs. and 6 figs. on 5 plates.

This is an account of anti-mosquito work carried out under the direction of the civil and military administrator of the sub-division of Boeton, who obtained his knowledge of the manner in which the sanitary measures should be conducted from the study of a booklet entitled "The Sanitation of Sibolga", published by the Public Works Department. It is an excellent example of what can be achieved by non-technical individuals who are prepared to put their own hands to the work with the means at their disposal.

A swamp of some 30 acres in extent situated in the immediate vicinity of Baoe-Baoe, which was subject in places to tidal flooding, was believed to be the probable breeding-place of Anophelines. Until 1922, it is stated, Boeton, and more especially the capital Baoe-Baoe, was a hotbed of malaria. No European stationed there escaped infection, and in the encampment the brigades were only able to march by combining two brigades into one. The number of deaths in the civil infirmary and in the prison was very high, and in a strength of 350 people on an average amounted to 20 monthly. In the adjacent district of Bataoeloe the splenic index of children from 2–10 years amounted to 100.

The entire work was carried out in three months, at a cost of f.11,440, statute-labour being employed. The methods employed consisted of the following :—

1. Cutting all reed-grass and brushwood, and thoroughly weeding out all the roots.
2. Raising those sections for which this was necessary with regard to the water level. For this purpose some 50,000 cubic metres of soil were required, and an underground water level of –1 metre was aimed at.
3. The construction of a system of closed drains in order to drain the rain and surface water. The main drain, however, had to be left open, but it was provided with a cement floor in order to facilitate cleansing. In one situation an intercepting drain at the foot of hills was necessary.
4. The construction of three sluices to permit drainage to the river when low and to prevent flooding at high tide.

Details of the drainage are of interest. The cement floor for the main drain was provided as shown in fig. 51.

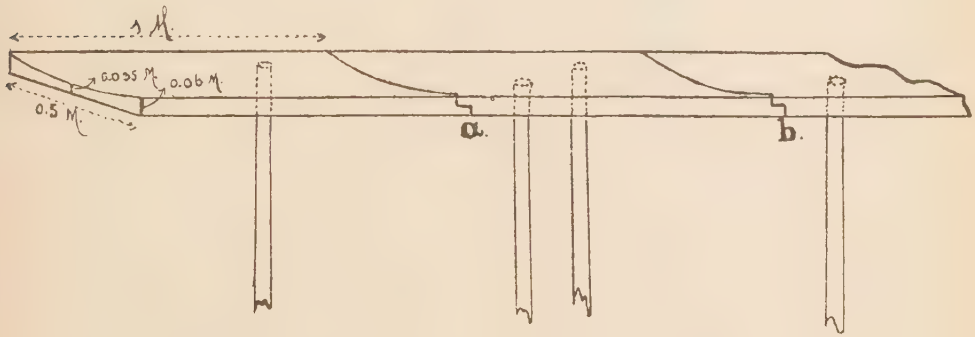


Fig. 51.—Sanitation of Baoe-Baoe Swamp. Construction of the floor of main drain. Cement slabs connected by rectangular joints as at *a* and *b* and supported by mangrove piles driven about 3 metres into ground.

The cement slabs were connected at *a* and *b* by a rectangular joint. The soil being exceedingly muddy, the slabs were laid on a bed of sand 0·5 metres in depth and supported by piles (two to each slab) made of mangrove wood and driven to a depth of about 3 metres. The sloping sides of the drain were strengthened with coral-rag and the bottom 0·5 metres on each side of the cement floor was plastered. In this plastering holes were provided at 2 metres apart to facilitate subsoil drainage. A section of the completed drain is shown in fig. 52.

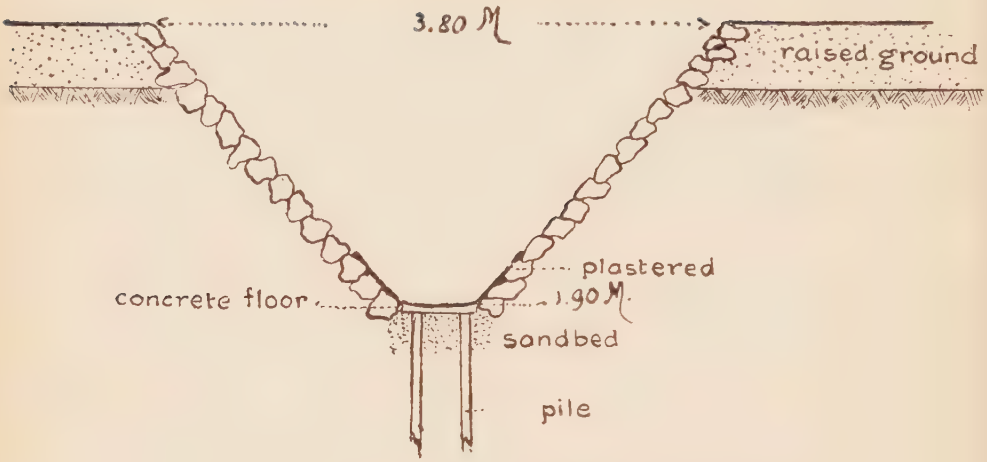


Fig. 52.—Showing section of main drain completed.

The methods by which the closed drains were made is shown from figs. 53, 54 and 55.

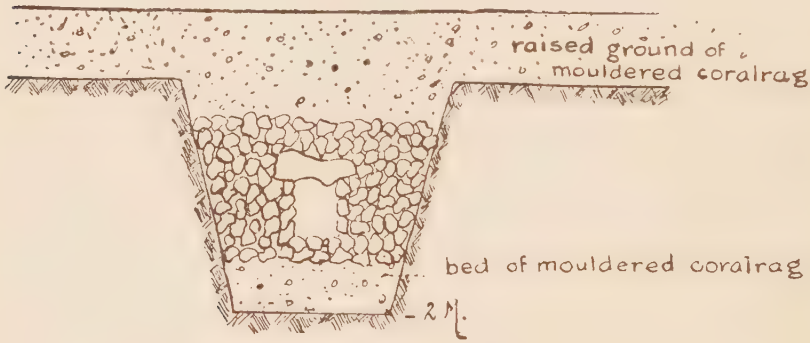


Fig. 53.—Showing method of construction of a closed drain.

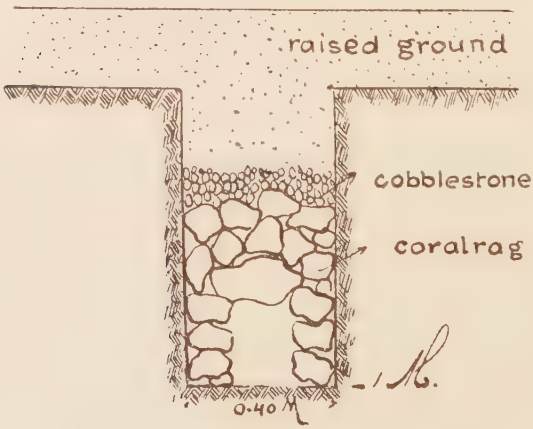


Fig. 54.—Showing method of construction of a closed drain in a section where formerly mud heaps due to crabs had caused a nuisance.

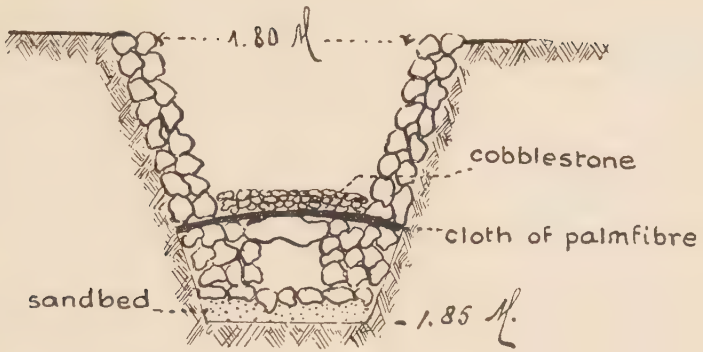


Fig. 55.—Showing method of conversion of a shallow ditch along road into a closed drain.

[Figs. 51 to 55 reproduced from *Mededeelingen van den Burgerlijken Geneeskundigen Dienst in Nederlandsch-Indië.*]

In certain positions trouble was experienced after the section had been raised to the necessary level from heaps of mud worked up by crabs; the provision of the closed type of drain, however, abolished the trouble owing to the satisfactory drying of the ground that resulted.

The good accruing from the work undertaken is shown by tables consisting of the number of temperatures taken in the infirmary of the women and children who were either patients in hospital or who attended for out-patient treatment. A summary is given:—In 1922, 778, and in 1923, 183 cases. The splenic index of children from 1–10 months situate within a radius of $1\frac{1}{2}$ kilometres round Baoe-Baoe after the sanitation works was completed amounted to 13. Of older children from Bataoeloe of the age group 2–10 years, among whom a splenic index of 100 was recorded in 1922, the corresponding figure after completion of the works was 32·5. The mortality in the infirmary and in the prison had fallen from 20 deaths per month to about 3 a month. The reclaimed swamp was also in considerable demand for coconut and banana planting, and for land on lease for building purposes; in one section a vegetable plantation was established, and in other positions a race-course and a football ground had been provided.

Revista Medico-Cirurgica do Brasil. 1925. June. Vol. 33. No. 6. pp. 273–286.—**A Saúde Publica no Brasil em 1924.**

A summary of public health conditions and projects in Brazil in 1924. Figures show that the death-rate is steadily diminishing—20·17 per mille in 1922, 18·35 in 1923, and 16·04 in 1924. Smallpox, owing to thorough vaccination and re-vaccination, is now officially declared to be extinct in Rio de Janeiro. Tuberculosis is still widespread, and the Government is taking in hand the construction of a hospital for tuberculous patients at Jacarépaguá. Educational propaganda and the appointment of health visitors are proceeding. Yellow fever is practically abolished from Rio de Janeiro, but cases still occur in places on the coast and in the Northern States. For dealing with leprosy, proposals are brought forward for the establishment of the colony system in the Northern States and of a leprosarium near the capital. Extensive plans for the amelioration of the water-supply are being carried out, and the report states that it is hoped the work will be

completed by next June. Due acknowledgement is made of the help afforded by the Rockefeller Foundation and the staff of the Instituto Oswaldo Cruz.

H. Harold Scott.

Leiper (R. T.). **The Public Health Significance of Recent Advances in Helminthology.**—*Jl. State Med.* 1924. Nov. Vol. 32. No. 11. pp. 531–534.

The knowledge of helminth infection now acquired as a result of research should, if properly applied, ensure the control and eventual eradication of the infestations of man with parasitic worms.

The important facts from a public health point of view are :—

(*a*) That parasitic worms do not multiply within the human body.

(*b*) That the eggs or embryo must first leave the human body which harbours the parents. The great majority leave in the faeces, others leave in the sputum or urine and some which circulate in the blood can only leave if sucked up by a biting insect. The guinea worm is peculiar in that she discharges her young through a breach in the skin in the hope that they will reach water.

(*c*) That the eggs or embryo are not infective to man at the moment of leaving the human body (except in those cases in which man can also become infected with the larval forms).

(*d*) Developmental changes occur during the period of delay outside the body, and are essential to the formation of the "infective" stage.

(*e*) The environmental conditions requisite for the developmental changes outside the body vary with the different species.

(*f*) The infective stage enters the body in most cases by the mouth in food or as contaminations of food, but in certain instances the infective stage actively pierces the skin.

(*g*) After entry, the infective stage has, in many species, to undertake an extensive pilgrimage within the body ; in some cases through the blood stream, in others through the tissues or serous spaces, before it can successfully attain to sexual maturity in its normal habitat.

(*h*) Few of the parasitic worms are specific to man. It more frequently happens that the same species is also prevalent in one or other of the domestic animals. These additional "reservoir" hosts may play an important part in the spread of infection.

Control of helminthic infection may be secured by breaking the life-cycle at certain vulnerable points :—

(1) The adults may be killed by anthelmintics within the human body. (This applies to intestinal forms.)

(2) The eggs or embryos may be killed while in the human body by therapeutic agents. (This applies so far to Bilharzia eggs.)

(3) The eggs and embryos, when in the body discharges, may be "sidetracked" by "conservation" measures, or in many cases simply by lack of access to water necessary for the hatching of the eggs.

(4) Re-entry of the infective stage may be prevented by—

(*a*) Avoidance of exposure to infective soil (*e.g.*, the use of boots and clothing in the case of hookworm).

(*b*) Avoidance of bathing in canals and ponds liable to be contaminated (*e.g.*, Bilharzia).

(*c*) Avoidance of raw unfiltered water for drinking.

(*d*) The cooking of fish, meat, and shellfish, including fresh-water prawns and crabs, and of vegetables upon which eggs may have been deposited (Ascaris, Trichocephalus) or infective larvae become encysted (*Fasciolopsis buski*).

(5) Where an intermediate host is essential, a knowledge of its bionomics or susceptibilities may suggest means by which it can be eradicated, *e.g.* :—

(*a*) The use of chemicals, such as copper sulphate, which have a lethal action even in high dilutions against fresh-water molluscs; the introduction of ducks and the sudden exposure of the molluscs to drying as has been suggested in Egypt for the control of bilharziasis.

(*b*) The reduction of numbers by hand collection, as has been tried against *Melania* molluscs responsible for the spread of lung-fluke in Asia.

(*c*) The application of anti-mosquito measures for the control of filariasis.

In order to utilize the knowledge we now possess, the Medical Officer of Health should have a sound working acquaintance with the life history and all other necessary matters connected with the parasitic worms which are of moment in endeavours to prevent disease arising through their agency.

Munro (David). **The Influence of Aerial Transport on Epidemiology.**—*Public Health.* 1925. June. Vol. 38. No. 9. pp. 271–274.

This subject was dealt with in the Presidential Address to the Naval, Military and R.A.F. Hygiene Group, Society of Medical Officers of Health, London, 5th December, 1924. It is a matter that must have some time or other entered the minds of many.

That aerial travel is of import from the point of view of the prevention of disease is obvious, for the interval between embarkation and landing is so shortened that no longer is it possible to quarantine a "contact" or a "suspect" on landing, unless by wireless notification to the air-port of arrival the authorities there can get sufficient time for action.

The steps, therefore, required to deal with the diffusion of such diseases as cholera, typhus, smallpox and influenza have to be considered in a new light, and thus constitute one of the problems of aviation of international importance. The existing organization whereby weekly bulletins are issued, while still sufficing for any ordinary menace by sea, will not provide a sufficient safeguard where aerial travel is concerned.

Instance as to the possible rapid spread of infective disorders through aerial transport was supplied by the outbreak of cholera in Iraq in the previous year at a time when the annual pilgrimages to various holy places in other countries were in being. Communication between Iraq, Palestine, and Egypt has developed to such an extent that Baghdad is now less than 24 hours distant from Cairo, and the journey is performed regularly by air in less than the incubative period of the disease quite apart from the question of "contacts" or "carriers."

The address also dealt with the possibilities of the spread of diseases and their introduction *de novo* to countries so far exempt. One has only to imagine a Communication Service—for example, an Airship

Line between India and Africa (and this may not be so many years ahead)—taking hours instead of days, and the danger comes within measurable distance.

Mankind is, however, not the only consideration, for the re-infection of England with rabies after an immunity of many years has actually occurred, due, it is believed, to the importation of a rabid dog by aeroplane. The eradication of this outbreak alone must have cost this country a very considerable sum in money, let alone other matters connected with the measures necessary to stamp out the disease.

An interesting point is raised as to the possible spread of infection from aeroplanes either by accident or by malice aforethought. It is held that this is not a serious danger, for the influence of gravity in the fall reduces semi-solids to a finely particulate state. This has been proved by the experiment of dropping eggs out of aeroplanes from several thousand feet; they simply disappear into fine egg-rain before they reach the ground. It is probable also that bacteria would not survive the swiftness of their descent.

FISHER (H. C.). **The Panama Canal as a Barrier against the World-Wide Spread of Disease.**—*Milit. Surgeon.* 1925. July. Vol. 57. No. 1. pp. 18–22. With 1 map.

Apprehension has not infrequently been expressed that the Panama Canal might facilitate the spread of certain diseases. This article explains, however, that on the contrary the Canal is an active force for the detection, suppression and eradication of communicable disease owing to the unceasing vigilance of the Canal Authorities and to the efficient manner in which preventive methods are conducted. The two chief diseases of concern are yellow fever and plague.

In at least one seaport actual stegomyia control was inaugurated and effectively carried out, and the port, which was situated in a country where yellow fever existed, was thus rendered practically non-infectible. Cordial relations and mutual co-operation between the United States and the countries concerned enabled these measures to be undertaken.

While yellow fever existed, ships from infected countries were fumigated preferably at port of departure or upon arrival at the Isthmus. If necessary the ship was held in quarantine during the incubation period of the disease, the passengers carefully inspected in order to remove any sick from their midst, and a careful search made by trained mosquito catchers for any stegomyia mosquitos that may have remained on the ship.

As regards plague, the terminal cities of the Canal are models of ratproof construction, and regulations as regards building are strictly enforced. The greatest care is taken to prevent the breeding and harbouring of rats. A daily catch is made from localities bordering the water fronts as an index of prevalence; so far no infected rodents have been found. As the result of these measures rats have become relatively scarce, and it is believed that there is very little chance of bubonic plague existing or being propagated.

That these precautions have been successfully taken without causing interference or obstruction to shipping agents, masters and owners, is

shown by the fact that letters are actually received containing appreciation and commendation from shipping interests of the work done by the quarantine stations. It is realized that sanitation pays.

WALLACE (Edward Wilson). **Co-operation in a School Health Programme.**—*China Med. Jl.* 1925. May. Vol. 39. No. 5. pp. 437–444.

Every missionary can recall tragic cases of gifted boys and girls whose lives have been cut short, or whose usefulness has been impaired, by lack of proper attention to their bodies. Experiments in co-operation between doctors and teachers have shown what can be done to cure and to prevent disease.

The China Medical Missionary Association and the China Christian Educational Association jointly arranged for a "School Health Conference" to which the Council on Health Education, the Y.M.C.A., the Y.W.C.A., and the Nurses' Association of China were asked to appoint representatives. The Conference met on three days in December, 1924, and the point debated was "What is the need for the co-operation between doctors and teachers in securing the health of students, and what procedure will secure that co-operation?"

The Conference agreed that a "School Health Programme" must include six things:—

1. There must be a sifting or "screening" of students who enter the schools, in order that those who will be a menace to the well-being of the student body may be excluded.

2. Since disease may attack a student at any time, there is need for constant watchfulness, and it is held that a regular health examination at least once a year is an essential part of any attempt to keep students healthy.

3. When remediable defects and diseases have been detected, responsibility for seeing that the treatment is given and for checking results should rest with the school principal, while the actual treatment would be given by the school nurse or doctor, where there is one, or by the hospital staff either in their regular clinics or in special school clinics. Examples showed that a better organization of the existing personnel and time-tables was more necessary than a larger personnel and more time.

4. The Council on Health Education and the China Christian Educational Association were invited to consider the securing of better textbooks and teachers' manuals on health subjects, and to draw up synopses of practical courses of instruction. It was recognized that school and college provide ideal centres for the dissemination of knowledge concerning the health of both the individual and of the community.

5. It was agreed that what students require is not so much drill and calisthenics as the organized playing of games that has been given so large a place in school life in England.

6. Sanitation of the school plant and of the school routine is of the utmost importance.

The missionary of broad vision realizes that man possesses a body as well as a soul.

Southern Medical Journal. 1925. June. Vol. 18. No. 6. pp. 432 482. With 3 text figs. 17 refs. **Symposium on Malaria.** [Ferrell; Walch; Hegner; Darling; King; Maxcy, Smillie & Plecker; Le Prince; Welch; Fricks; Rankin; Bair; Fort; Dowling; Underwood; Enloe; Hayne; Crittenden; Duggan; Williams; Lenert; Rawlings.]

Note may be made of the following contributions :—

Ferrell (J. A.). The Malaria Problem in the South.

The distribution, incidence and severity of malaria throughout the country has steadily declined since the Civil War. In the New England States, New York City, New Jersey and Indiana the disease is no longer considered to be of any public health significance. Similarly it has receded over an extensive area, including the Middle Atlantic and Middle Western States, so that now only 16 States contain counties in which the disease may be regarded as of public health importance. The factor of the greatest importance has been drainage for the purpose of reclaiming land for agricultural purposes.

The forces operating against malaria in the South have been systematically stimulated during the past 10 years by public health agencies.

Walch (E. W.) Some remarks on the Malaria of the Dutch East Indies.

Generally speaking, malaria still remains a greater problem than does hookworm disease. More than 20 species of Anophelines exist, of which only 3 or 4 are nowadays considered as carriers of importance. Continued experience and study of epidemics resulted in the possibility that the number of carriers in nature was greater than was first thought, and it was disclosed that certain species which were usually regarded as practically harmless could, under circumstances difficult to define, be responsible for epidemics. In this connexion *A. sinensis* and *A. kochi* might be mentioned.

As regards *sinensis*, until recently it was disregarded as a carrier, especially of subtertian fever, but an epidemic of this type of the disease among 800 coolies was found to be chiefly occasioned by this Anopheline. It was thought that the variation in infectivity might be accounted for by (*a*) either, a greater preference of the mosquito for lower animal blood, but experiments with buffaloes were inconclusive; (*b*) or, that there are two varieties of *sinensis* of different susceptibility, the *vanus* type of this mosquito having been associated with the epidemic observed.

On the matter of spleen indices it is recommended that the method of measurement described by Christophers be used, viz., (*a*) the distance of the apex of the spleen from the umbilicus; (*b*) the distance of the same point from the middle line of the body.

As regards prophylactic quinine, which was given in doses of $\frac{1}{2}$ gramme of the hydrochloride on 2 or 3 days a week to Chinese coolies engaged in rice cultivation, failure due to inadequate supervision in the taking of the drug was first experienced. Rapid improvement in the condition of the children was, however, evident when the administration was carried out under daily control of an European supervisor. The beneficent results of prophylactic quinine properly administered was also evident in the case of coolies in the rice fields to whom it was given and villagers who took scarcely any.

The value of catching adult mosquitos as a means of control is emphasized. The whole population, including children, was armed with

catch-tubes made of bamboo, and a small reward was offered for captured anophelines. The effect was striking; before instituting the method a catch of 6,000 per month was obtained, but after the new scheme was in force the catch mounted to 33,000 in a population of 800 persons.

There is a general tendency in the Dutch East Indies to believe that a screen of cattle has considerable value in preventing infection of human beings, and the subject is being further investigated. Apparently it is chiefly a question of the relative numbers of men and animals, a sufficiently high proportion of the latter being apparently necessary before protection to human beings is afforded.

Darling (S. T.). Medical Research in Malaria.

The following extracts from the communication may be noted:— The condition of the spleen in relation to malarial infection is shown in the subjoined table, the method of estimating the splenic enlargement being the usual, *i.e.*, (1) negative on deep inspiration, (2) palpable on deep inspiration, (3) palpable on normal inspiration, but not 1 finger breadth below the costal margin, and (4) one, two or three finger breadths below the costal margin on normal inspiration. The examination was carried out in coloured boys and girls prior to August 1st.

	Negative.	Palpable deep inspirat.	Palpable normal inspirat.	Fingers below costal margin. one.	two.	three.
Number of cases examined	267	17	104	20	23	15
Number of cases positive blood	30	4	30	8	13	11
Per cent. of positive blood	11·23	23·53	28·84	40	56·52	73·33

The haemoglobin content provides interesting comparison with the spleen and parasite rates in a malarial survey. For the purpose of valid comparison it is necessary to divide the children into age groups, and if this be done a striking correspondence between the splenic enlargement and the degree of anaemia is evident, particularly in the age-groups of 2–5 years. The greater the enlargement of the spleen the lower the average of haemoglobin in the groups.

On the natural history of malaria, observation was made as to the natural course of events in a negro family who except for undernourishment were otherwise of normal healthy stock. They lived in an unscreened house without quinine medication and were naturally infected with malaria. The mother was 32 years of age and the children 9, 6, 4, and 2 years respectively, two being boys and two girls. Comparatively few acute episodes occurred during the more than a year that they were under observation.

As regards symptoms, the mother had chills when her blood showed parasites. The girl aged nine had 4 chills during 6 months while her blood was positive, and tenderness over the spleen for 2 weeks. The boy aged 6 had no chills though his blood contained parasites for 5 months. The boy aged 4 years had only one chill during 12 months, when for a period of only two weeks his peripheral blood had been negative. The girl aged 2 had 10 chills in 12 months, her blood being negative only four weeks of this period. All the children looked normal and none looked chronically ill.

From the time of the first examination in November, 1923, until the beginning of an eight weeks' standard quinine treatment in March, 1924, all had shown parasites in the peripheral blood. The number of parasites ranged from 700 to 1 per 500 fields, and of gametocytes from 65 to 1 per 500 fields. The mother had all three species of parasite in her blood, as also had the girl aged 9. The boy aged 6 had only quartan, the boy aged 4 only subtertian parasites, the girl aged 2 had tertian and subtertian. Excepting for two weeks in March, two in April and three in May, one or more members of the family were at all times carriers of male and female gametocytes in sufficient numbers to be infective.

In general the haemoglobin curve inversely followed the parasitic curve. As regards spleen, the organ was palpable at all times in the children. In the girl aged 9 and the boy of 4 it ranged from palpable to the umbilicus ; in the case of the youngest child from 2 finger breadths to the pelvis. In every case the size of the spleen varied from week to week, notable increase in size coming about a week after a notable increase in the number of parasites in the peripheral blood.

The association of blackwater fever with malaria is emphasized. An epidemiological feature which may have some significance is that a "house" or family susceptibility was noted. This suggests that haemolysis in blackwater fever may be due to an anti-haemolytic mechanism rendered defective in certain familial groups of persons by attacks of malaria and that this peculiar defective mechanism is heritable. Further, in view of the absence of the disease among pure-blooded negroes, many of whom suffer from malaria to the same extent as the whites who have blackwater fever, and in view of the well-known fact that races and individuals possess types of blood constitution, there is a possibility that only a certain group of persons is susceptible to the disease and that this susceptibility is heritable.

An important advance in the treatment of blackwater fever would appear to have been made by Dr. O. L. Cranford, of Sasser, and Dr. O. W. Statham, of Leesburg, Georgia. This consists of the use of anti-streptococcic serum after the discontinuance of quinine. The serum is administered subcutaneously and the rationale is that the horse serum which it contains furnishes an anti-haemolytic substance to the blood of the blackwater fever patient. The results in some 30 cases treated by this method have been considerably in advance of other treatment, and the mortality rate has been very low.

Darling (S. T.). Entomological Research in Malaria.

A good many of the text books on malaria are compilations from the world's literature, and accordingly deal with other conditions than those to be met with in any particular locality. Borrow-pits are very generally stated to be breeding-places for anophelines, but this does not necessarily hold in a number of places in South Georgia. All borrow-pits are not a menace, and whether they will become so and breed *A. quadrimaculatus* depends upon their age and their proximity to habitations. In the newer pits plankton is scanty and sometimes limited to crustacea and diatoms ; under these circumstances they do not support a rich anopheline fauna. When borrow-pits grow old and become filled with vegetation, then, in the neighbourhood of habitations, when other breeding-places customarily used by *quadrimaculatus* have dried out these possibly become implanted. Some discrimination

should therefore be exercised in the destruction of borrow-pits when there are other real problems affecting malaria in the neighbourhood.

Again, as a generalization the attitude of the resting mosquito is cited as a diagnostic point between anopheles and culex. *A. quadrimaculatus*, the malaria carrier of the Southern States, has a culex-like attitude when resting.

The relation of air and water temperatures to the density of larvae and adults has been traced. *A. crucians* appears in largest numbers in March, April, May and June, rapidly diminishing in July and thence more slowly. *A. punctipennis* appears throughout the year, adults increasing somewhat in numbers in the cooler months of spring and autumn. From the epidemiological point of view *A. quadrimaculatus* is the one species the density of which is positively correlated with the prevalence or intensity of malaria.

As regards feeding habits, the precipitin test gave the following results :—Of 236 *crucians*, 157 fed on cow, 33 on pig, 30 on horse, 11 on dog, 2 on chicken, and only 3 on man. Of 272 *quadrimaculatus*, 88 had fed on man, 130 on cow, 41 on pig, 7 on horse, 4 on dog and 2 on chicken. All the 10 *punctipennis* tested from which valid data were obtained had fed on animals and none on man.

Catches of adult female mosquitoes established the following :—*Quadrimaculatus* is to be found inside and under houses ; *crucians* is found under houses, under culverts and in outbuildings, but rarely or never inside habitations ; *punctipennis* is found in animal sheds, outbuildings, under bridges and under trees or other sheltered places out of doors. *Punctipennis*, while preferring animal blood, will attack man when he visits the resting places of the species in woods, particularly near streams. *Quadrimaculatus* is distinctly fond of human blood and is commonly found to enter houses at night through windows or doors or chimneys.

The dispersion of *quadrimaculatus* was studied. Most of the mosquitoes were found within $\frac{3}{4}$ of a mile from the breeding-place ; very few had travelled as far as $1\frac{1}{2}$ to $1\frac{3}{4}$ miles—none were found beyond this distance.

Observations showed that *A. quadrimaculatus* may remain but a day or two within a habitation after obtaining a blood meal ; she then leaves the house for another resting place. That means that the mosquito usually completes a feed upon one person and does not remain in the house for more than a day or two. From this it follows that an infected anopheline will usually infect only one individual and will not infect a large number of persons as at one time has been suggested. Secondly, as the anophelines which have fed upon the inmates remove from the building in a day or two and their places are taken on successive nights by successive lots of mosquitoes, then, if it is desired to fumigate houses for the destruction of mosquitoes it will be necessary to do so every other day or two ; otherwise mosquitoes which have become infected will have left the house without being destroyed. House fumigation, therefore, is probably an impracticable measure.

Many of the contributions to the Symposium on Malaria relate to activities in the control of the disease in the various Southern States, and they do not contain matter of sufficient general interest for mention in the Bulletin.

Corner (William). **Malaria in the Kirkuk Division of Northern Mesopotamia during 1923.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. Mar. 19 & May 21. Vol. 19. Nos. 1 & 2. pp. 41–69. With 8 charts and 2 maps. [5 refs.]

The following are the main features as to incidence of malaria amongst indigenous natives in the Kirkuk Division of Mesopotamia during 1923:—

1. There are two malaria seasons:—

(*a*) The main one in the summer, from the beginning of June to the middle of August, caused by the malignant tertian and to a less extent by the benign tertian parasites; and

(*b*) The lesser in the autumn occurs in late October and November, being most marked in the first half of the latter month. It is due to the malignant tertian parasite.

2. Malaria in 1923 showed certain features which were the outcome of epidemic malaria in the preceding summer. There was marked prevalence and predominance of residual quartan, which existed during the first 5 months of the year until the starting of the malarial season.

3. It is judged that quartan malaria is a comparatively common infection, and that its marked predominance was due to residual infection from an epidemic year in an area where quartan is particularly common. Quartan malaria was not confined to any one part of the division, but was equally prevalent everywhere.

4. Malignant tertian was the main cause of the summer and of autumn malaria seasons. Infections started somewhat later than the benign form (roughly 15 days) and rapidly disappeared with the passing of the malarial season. Crescent infections were comparatively not common. The main clinical manifestation was a quotidian fever of no great severity. Pernicious forms were absent.

Benign tertian was the earliest to appear in any number at the opening of the malarial season. This parasite seems to depart markedly from its usual rôle as a cause of relapses, its disappearance at the end of the malaria season closely resembling that of malignant tertian. There was no evidence that benign tertian was a factor in the autumn malaria season.

The season of quartan infectivity presumably coincided with the summer malarial season. This, however, could not be proved, fresh cases being obscured by the mass of already existing quartan fever. Triple infections were comparatively common, especially in the early months. Double infections were not common. Quartan malaria, as met with, has quite sustained its reputation as the cause of the extremely chronic infection.

5. Nomadic Arabs on the whole suffer very little from malaria. During both the summer and autumn malaria seasons they are in fixed camping grounds, and according to the malarial nature of these grounds so will malaria amongst them vary. Malaria was most seen among those who camped alongside the fringe of villages on the edge of the desert, to the west of Kirkuk and Taza Khurmatu.

6. The Quaraghan-Kifri-Tuz-Tauk-Taza-Kirkuk-Alton-Keupri road serves as a rough line of division of malarial endemicity. On the east

or hilly side malaria is hyper-endemic and shows very high spleen rates. The area to the west or desert side shows medium spleen rates, passing to low or nil the further one goes into the desert.

7. Malaria in the Kirkuk Division seems to be associated with :—

(*a*) A higher degree of splenic enlargement than that usually recorded.

(*b*) Very high spleen rates amongst the children and often a comparatively high rate in adults.

(*c*) A surprisingly low parasite rate in children and adults considering the high spleen rates.

The theory is advanced that (*a*) is due to the prevalence of quartan malaria. It is possible that this fact also contributes to (*b*) and (*c*).

8. Each malarial season was preceded by a marked increase of mosquito breeding, including anopheles.

9. A feature of the main malaria season was that it lasted throughout the hottest and driest month of the year, when the 8 a.m. mean temperature was about 90° F. and the mean relative humidity was below 30 per cent. Humidity, within limits, appeared to be of comparatively little importance in influencing malarial prevalence.

Rodenwaldt (Ernst) & Essed (W. F. R.). **Investigation into the Malaria at Tandjong Priok.**—*Meded. Dienst. d. Volksgezondheid in Nederl.-Indië.* 1925. Pt. 2. pp. 89–121. With 19 charts & 1 folding plan.

The following are the measures undertaken and the conclusions arrived at :—

At the end of 1922 the Batavian Public Health Service had sent information to the effect that the mortality figures for Kampong Kodja were rapidly falling, and it was proposed that the further direction of public health works should be taken over by the Chief of the Public Health Service. The following suggestions were made :—

1. All the drains in the whole harbour area of Tandjong Priok will need to be kept under observation for mosquito larvae and, if necessary, oiling will have to be instituted without delay.

2. In Kampong Kodja proper oiling of all drains should be continued once every five days. Two coolie gangs, one for oiling and the other for larva-hunting, will be required, they should work under the supervision of a sanitary inspector.

3. The fishponds east of the fishing harbour will have to be opened to the free entrance of the tide, and to be regularly cleaned.

These measures have had favourable results, and the condition of the coolie population as regards health has shown improvement during the latter half of 1922 and the whole of 1923.

The following are the final conclusions reached :—

(1) Malaria in Tandjong Priok is transmitted by *A. ludlowi* Theobald. It is probable that *A. rossi* also plays a certain part as a carrier.

(2) The most dangerous breeding places in Tandjong Priok are those that are situated in the harbour area proper, *e.g.*, drains with stagnant water, holes and pools which are formed by the ground water or made during the construction of new canals.

(3) The rice fields south of the harbour area are not dangerous in their present condition. It, however, must be remembered that they may become a source of danger if fishponds are constructed therein. This should be prevented.

(4) The mangrove bush at the west now and again produces great numbers of *A. indiens*. Though the danger for the west end part of the harbour is probably not very great owing to it being sparsely inhabited, yet it seems advisable that later on this land should be raised for a distance of 1 kilometre from the harbour area.

(5) In addition to other places the fishponds to the east must be regarded as dangerous as they are only some 450 metres from inhabited areas. If possible they should be filled in to a distance of at least 1 kilometre from the fishing harbour. If this cannot be undertaken on grounds of economy, the working of the ponds should be discontinued, free entrance to the tide provided and vegetation kept down.

(6) It has been shown that *A. ludlowi* readily breeds in collections of foul water. It can breed in fresh water or in salt even when the latter contains as much as 30 parts of salt per thousand. In fishponds it appears to thrive best in water containing from 12 to 18 parts per thousand. The essential condition is that decomposing matter must be present in the water, and it is not hampered by water strongly contaminated by faeces or urine.

(7) Oiling of the breeding places is an effective measure against *A. ludlowi*. Owing to the rapid disappearance of imagines where oiling was in force it is suggested that the life of the mosquito is short.

(8) Benign tertian infections gave rise to a carrier state more frequently than malignant infections. Six months after the measures mentioned had been applied the parasite rate in all groups of the population showed a very considerable decrease.

(9) No diminution in spleen rate was noticed in adults within six months of the application of the measures. With children, although no diminution of spleen rate was observed, a considerable decrease in the size of the spleens was noted.

(10) It is considered that the rise in the percentage of haemoglobin observed was due to the measures taken.

GAGE (E. H.). **Studies of Impounded Waters in Relation to Malaria.**—*Public Health Rep.* 1925. June 26. Vol. 40. No. 26. pp. 1357–1375. With 3 text figs. & 2 figs. on 1 plate.

It has been found that many factors must be considered in determining the potential danger of an impounded water from the malarial standpoint. Size alone is certainly not the most important factor, for the largest impounded water projects are frequently the least dangerous. Large reservoirs are often located in mountainous regions, with sparse settlements on their borders. It frequently happens, however, that small ponds impounded on the outskirts of villages as a recreation pond, water supply, or stock pond, may prove to be a greater malarial menace than the much larger body of water many miles away in the mountains.

Examples are given of various impounded waters which proved productive of malaria, their conditions are described and the species of anophelines discovered are detailed.

Certain procedures tending to reduce the production of mosquitoes in impounded waters have been outlined by the United States Public Health Service, which may be summarized as follows:—

(1) Clean banks.
  (*a*) Fluctuation of water level.
  (*b*) Removal of flotage.
(2) No aquatic vegetation reaching the surface of the water.
(3) A minimum area of shallow overflow at summer water level.
(4) Care of imported labour.
(5) Impounding of the water during the winter months.
(6) Introduction of *Gambusia affinis*.
(7) Occasional observation of the pond and its immediate vicinity.

These procedures are necessarily of a general nature, and the particular methods best suited to any one project can be determined only by a field survey.

LOW (N.). **Anti-Malarial Work in Ismailia.**—*J. Roy. Army Med. Corps.* 1925. July. Vol. 45. No. 1. pp. 52–54. With 1 text fig. [2 refs.]

The object of this communication is to raise the point as to whether *A. pharoensis* is to be regarded as even a potential carrier of malaria. In 1923 both *A. multicolor* and *A. pharoensis* were taken and some 60 primary cases of malaria were evident among the members of the garrison. In 1924 no *A. multicolor* could be found, but *A. pharoensis* was abundant and invaded the camp from a marsh distant nine kilometres when the prevailing wind was from that direction; no primary malaria, however, occurred. Ample opportunities of infection were present, the troops at the time in the station having been heavily infected elsewhere before arrival at Ismailia, and having many chronic carriers amongst them.

In the "Official History of the War, Hygiene," Vol. ii, p. 209, *A. pharoensis* is stated to be the common carrier in Egypt. If that be so, it might have been expected that cases of malaria would be evident under the circumstances. If this mosquito is only such an occasional carrier as to be found practically of no malarial import, it is possible that a great deal of anti-malarial work may be saved.

BARNES (M. R.). **A Survey of the Turpentine Industry for Possible Larvicidal Substances.**—*Amer. Jl. Hyg.* 1925. May. Vol. 5. No. 3. pp. 309–314. [4 refs.]

The following raw materials, products and by-products of the turpentine industry, were studied upon the larvae of *Anopheles maximaculatus* Say, and various undetermined culicine larvae—crude gum as collected from turpentine trees, low wine (the aqueous distillate which comes from the condensing coils with the turpentine), sawdust from turpentine pine, turpentine oil distilled from gum, dross, rosin and pine oil.

Larvicidal properties in sufficient strength to merit further investigation were found only in turpentine and in pine oil. Turpentine is, however, too expensive to be employed in anti-mosquito work. Pine oil was found effective against both anophelines and culicine larvae and was further studied.

Barnes (M. E.). **The Toxic Action of Oil Films upon Mosquito Larvae with Particular Reference to Pine Oil Films.**—*Amer. Jl. Hyg.* 1925. May. Vol. 5. No. 3. pp. 315–329. [18 refs.]

It was found that pine oil had a powerful soporific or paralysing effect upon larvae and pupae, and in effective doses results in their death either directly, or, apparently by drowning while under the effects of the oil. Both anopheline and culicine larvae are able to withstand prolonged submersion in water, and in some cases even after they have been subjected to an oil film and submerged in water it is possible to resuscitate them.

Pine oil, while a valuable agent, is not satisfactory from the point of view of film production, and it is suggested that another oil may well be utilized as a vehicle for carrying the toxic effects of the pine oil. A mixture of crude oil and pine oil in the proportion of one of the latter to nine of the former produces a better film than either of the ingredients alone, and forms a compound which is highly effective in destroying all stages of anopheline and culicine larvae and pupae.

Annales de Médecine et de Pharmacie Coloniales. 1925. May–June–July–Aug. Vol. 23. No. 2. pp. 343–346. **Instruction pratique pour la lutte contre le paludisme.** [Instruction adoptée par la Société de Pathologie exotique dans sa séance du 11 mars 1925.]

In response to a request from the Minister for the Colonies the Société de Pathologie Exotique has drawn up directions for combating malaria. All the well-known measures are set down and discussed, with a reminder that unforeseen expenses may be looked for. The employment of a trained entomologist for the study of the anopheles of local importance is insisted upon.

Six grains of quinine a day in two doses, or 15 grains twice a week, is recommended for all the infected. Free prophylactic quinine is reserved for persons under discipline (troops, prisoners, etc.), to whom 3 grains a day is given when the risk of infection is slight, but six grains a day is recommended for those exposed to intense infection.

Screening, when carried out with good materials and under supervision, is good, but as frequently done increases danger, and is best confined to those who themselves wish to employ it. The pursuit of adult insects in houses is useless unless thorough. As to treatment of acute attacks, the advice is that the dose of quinine for an adult should never exceed 30 grains in 24 hours.

Stress is laid upon the necessity for improved agriculture, housing and improvement of the general economic conditions of the population as offering the only permanent means of rendering healthy a malarious country.

Haslam (J. F. C.). **Observations on the Experimental Use of Fish Indigenous to British Guiana for the Control of Mosquitoes breeding in Vats, Tanks, Barrels and other Water Containers.**—*Jl. Trop. Med. & Hyg.* 1925. Aug. 1. Vol. 28. No. 15. pp. 284–288.

Observations on the above were carried out on a large scale during August 1924, accompanied by closely watched experiments in the laboratory, and at the quarantine station and elsewhere.

The water containers to be dealt with are of innumerable variety, and include large specially built vats and tanks (comparatively scarce), 40 gallon casks (most common), old boiler casings, petrol cans, pans from derelict sugar mills, Dutch stoneware jars, and a host of makeshift and unscreenable containers.

The mosquitoes to be controlled and which select such receptacles as above for breeding are : *Aëdes argenteus* (*Stegomyia fasciata*) and *Culex quinquefasciatus*, and occasionally *Anopheles tarsimaculatus* has been taken in an open water vessel.

The following local fish were give a trial :—

Local Name.	Provisional identification.
Hassa	*Hoplosternum littorale.*
Patwa	*Cichlasoma bimaculatum.*
Congo Patwa	*Polycentris schomburghi.*
Kakabelly	*Peecilia vivipara.*
Hoorie	*Hoplias malabaricus.*
Sunfish	*Crenicichla saxatilis.*
Silverbait, also called Cellebe.	*Tetragonopterus chalceus,*
	Charax gibbosus,
	Hemigrammus unilineatus,
	Hemigrammus rodwayi,
	and one not identified.
Millions (a very small fish, locally so-called)	*Acanthocephalus melangonus.*
	Acanthocephalus reticulatus.

Of the fish experimented with the silverbait group, the hassa and the patwa appear to be the most serviceable.

For the smaller domestic water-containers it would be difficult to find a fish more generally suitable than the silverbait, whose good points may be summarized as follows :—

(*a*) Enormous appetite for all early mosquito forms.
(*b*) Preference for the forms most nearly hatched out.
(*c*) Ease of obtaining these fish in unlimited quantity.
(*d*) Ability of fish to live when only a minimum of water remains in barrels, etc.
(*e*) Ability of fish to find a living after the original supply of larvae has been devoured.

Considerable care is needed in their capture and transport.

Hassa and Patwa are less suited to the small containers, but do well in large vats and tanks. Among their advantages may be enumerated :—

Hassa.
(*a*) Good appetite for larvae.
(*b*) Fairly easily obtained.
(*c*) Stands rough handling very well.

Patwa.
(*a*) Enormous appetite for larvae.
(*b*) Fairly easily obtained.
(*c*) Survives well in large containers.

Their disadvantages are as follows :—

Hassa.
(*a*) May be stolen for food.
(*b*) May jump out of vessel.
(*c*) Does not seem to survive well unless large supply of larvae is continued.

Patwa.
(*a*) May be stolen for food.
(*b*) Does not stand rough handling well.

Hassa and Patwa can be used to advantage in such large vats and tanks as those of Government institutions, when the fish can be caught, handled and regularly observed by a trained staff. Throughout the villages, silverbait is proving the most satisfactory.

CAMERON (John). **Eradication of the Cockroach** (*Periplaneta* **sp.**). — *China Med. Jl.* 1925. May. Vol. 39. No. 5. pp. 458–461. [3 refs.]

In the *China Medical Journal*, xxxvii: 689, 1923, the author discussed the method then in use in the Pekin Union Medical College to rid the place of cockroaches. The powder then used was fairly effective, very cheap and easily prepared. The composition was as follows :—

Corn starch	8 ounces.
Cane sugar in fine powder	15 ,,
Quicklime, powdered	3 ,,
Borax, powdered	5 ,,

The whole should be well dried and thoroughly mixed and preserved in tins with tightly fitting tops.

Continued experiments were carried out during the past four years to find a more efficient compound, and in 1923 a patent preparation was purchased in America which was guaranteed to kill cockroaches. This compound was found to be most effective, but it was much too expensive for general use. Analysis of a sample showed that the principal ingredient was sodium fluoride.

Finely powdered commercial sodium fluoride was accordingly mixed with powdered borax in the proportion of four of the former to one of the latter, and this has been found to be the most efficient and economical of all the powders experimented with.

The powder should be sprinkled around the floor of the infested apartment, especially at the junction of the floor and walls, and it should be allowed to remain for at least 14 days undisturbed. Then it is advisable to sweep the floor clean and to sprinkle more of the compound. In this way any room can be cleared of cockroaches. Too much of the powder should not be used at a time, a little laid along the junction of the walls and floor is quite as efficient as the use of large quantities. Usually after the first day many dead cockroaches will by found, but it is essential to leave the powder undisturbed for at least 14 days so that the older cockroaches may carry small amounts into cracks and crevices where their young are. In this way both young and old are destoyed ; this process usually takes about a month.

BUCHANAN (George S.). **Les rongeurs et leurs parasites cutanés qui interviennent dans la propagation de la peste.**—*Bull. Office Internat. d'Hyg. Publique.* 1925. May. Vol. 17. No. 5. pp. 482–493. [1 ref.]

This is the second memorandum presented to the Committee of the Office International d'Hygiène Publique at the session held in April and May, 1925, by Sir George Buchanan, Senior Medical Officer of the Ministry of Health, as delegate of Great Britain.

Information was obtained from the following places: Palestine, Zanzibar, Nigeria, Iraq, Kenya, Hong Kong, Mauritius, Uganda, Straits Settlements, Gold Coast, Tanganyika Territory, and Ceylon.

A general summary is as follows :—

The black rat (*Rattus rattus*) is by far the most common at the present time in the African colonies (both eastern and western), in Palestine, and in Ceylon.

The brown rat (*R. norvegicus*) in unknown in Uganda and Tanga. In Ceylon it is only present in the poor parts of Colombo and in the vicinity of the port ; it is also found only in the ports of Palestine. On the contarary the brown rat represents 90 per cent. of rats caught in Mauritius, 70 per cent. in Iraq, and in the Straits Settlements and Hong Kong it is much the most prevalent.

In view of the circumstances that the capture of rats is frequently local in operation and depends upon special conditions (such, for instance, as the kind of bait employed), the relative proportion of the species caught in traps does not necessarily give at all times a true indication as to the general rodent population. Moreover, interesting changes take place with time ; for instance, that noted in Accra, where in 1908 *R. rattus* was not found, whereas in 1924 this species is more prevalent than *R. norvegicus*, which latter in 1908 was the most common.

The large pouched rat *Cricetomys gambianus* is found in Accra and also in Zanzibar. On only one occasion was this species found to be infected with plague at Accra ; occasionally, but rarely, other animals than rats have been found to be infected.

Five palm squirrels (*Funambulus palmarum*) were found dead of plague at Mawalapitiya in Ceylon, also one bandicoot, two mice and two cats. In Mauritius, 18 cats (17 of them in 1921) have also been found to be infected.

As to fleas, the reports show that *Xenopsylla cheopis* is probably the most dangerous rat-flea from the plague aspect. It is the most prevalent rat-flea in Palestine, Iraq, the Gold Coast and Zanzibar.

X. astia, which is considered as a species which harbours the plague bacillus, but generally without acting as a transporter of the organism to man, is the most common rat-flea in Ceylon. It is also found at Dar-es-Salam and Accra.

X. braziliensis appears to be the most prevalent rat-flea in Nigeria, Uganda and Kenya ; it is also present at Accra. It appears to be capable of transmitting disease to man, for at Kabete, 6 miles from Nairobi, it was the only species of flea found on black rats in a plague infected district.

Tiwari (C. D.) & Lal (R. B.). **A Note on the Efficacy of *Neem-battis* in the Destruction of Rats and Rat-Fleas in Rat Burrows.**—*Indian Med. Gaz.* 1925. July. Vol. 60. No. 7. pp. 310–311. With 7 text figs.

Fumigation of houses with cresol to kill fleas has shown that the fleas in rat holes are not killed, and that the rats are not affected. In order to kill the rats and fleas in the burrows, Lane (1924) devised the *neem-batti*. A standard *neem-batti* as issued by the Punjab Plague Equipment Depot, Jullundur, is prepared as follows :—

Pot. chlorat. dr. 2, Pot. nit. dr. 1½, and Sulphur dr. 2 are powdered together and mixed with dr. 5 of any oil to form a paste, to which dr. 1 of chilli-powder (red pepper) and a handful of crushed dried *neem* leaves (*Azadirachta indica*) are added. A wick of about nine inches made of thick cloth is soaked in a saturated solution of Pot. chlorat. The paste as above prepared is put over the wick leaving

about one inch exposed at the end. The wick is then encased in cloth and a piece of thick paper is wrapped round it. To use a *neem-batti* all openings, except one, of the burrow are closed, a *neem-batti* is then ignited and introduced into the open hole, which is then closed.

Experiments were carried out in natural rat holes in open fields, the holes were found to vary in dimension and design. They could be classified in the following groups :—

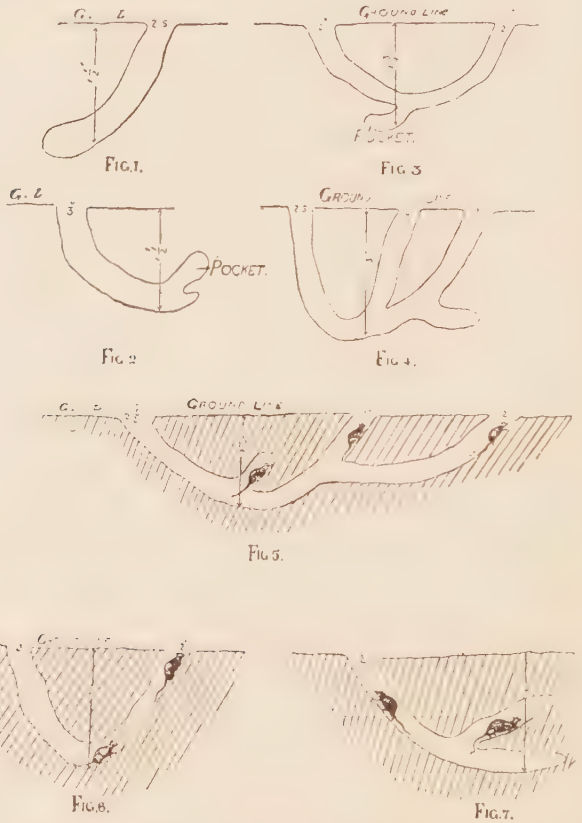


Fig. 56.—Showing various types of rat-burrows, and rats dead *in situ*.
[Reproduced from the *Indian Medical Gazette*.]

(1) A simple oblique blind hole (fig. 1).
(2) A blind hole with a side pocket (fig. 2).
(3) A burrow with 2 or 3 openings with or without pockets (fig. 3).
(4) A complicated burrow formed by the intercommunication of 2 or 3 burrows (fig. 4).

The diameter of the openings was between $1\frac{1}{2}$ to 3 inches and the maximum depth below the ground was 3 feet. The distance between two openings varied from 2 to 8 feet.

In a series of eight experiments in burrows of all types, in four of which the *batti* was allowed to smoulder for 5 minutes and in one each for 6, 8 and 10 minutes, the rats and the fleas on them were in all cases found to be dead. Figs. 5, 6 and 7 show the situations in which the dead rats were found.

It is concluded that fumigation with *neem-battis* in the manner described kills the rats and rat-fleas on them in burrows in fields in 5 minutes. It was noted that every nook and corner of the burrow was blackened with the smoke showing that all parts had been penetrated.

Severn (A. G. Millott). **An Outline of the History of Plague in Hong Kong.**—*Jl. State Med.* 1925. June. Vol. 33. No. 6. pp. 274–284. [21 refs.] also *Jl. Roy. San. Inst.* 1925. July. Vol. 46. No. 2. pp. 33–41. [21 refs.]

In 1894 plague appeared in Hong Kong having apparently arrived there from the province of Yun-nan about 900 miles distant, where it was known to have been endemic for many years.

The author details the state of knowledge regarding the disease at that time and carries the story on to the modern methods of prevention. Following on the active prosecution of present-day means of combating the disease, the incidence of plague has been gradually reduced until at the present time there has been no notification of rat or human plague in the colony of Hong Kong since September 1923.

WATER.

Stewart (A. D.) & Govinda Raju (V.). **Economical Use of Alum in Mechanical Filters.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 731–734.

In this class of filter it is usually stated that after cleansing an efficient filtration is arrived at after 15 minutes' run ; it is, however, usual that the addition of alum is continued throughout the filtration process even when turbidity of the water does not call for any such addition. This involves a considerable expenditure on alum, and any economy that can be effected in its use would be an asset.

The investigators found that 15 minutes' run was not sufficient to establish a satisfactory amount of bacterial purification. Half-an-hour's run was found necessary for this purpose. Furthermore, it was determined in every case under observation that the maximum bacterial efficiency was attained within an hour of starting the process, and that thereafter no further improvement was effected even in cases where the bacterial efficiency is low and considerable room for improvement exists. A 90 per cent. efficiency was all that the filters showed within an hour of start after which there was no further improvement.

It was furthermore found that if the addition of alum was stopped after the maximum efficiency had been attained by one hour's work, the results were just as good as when alum was continued during the whole process of filtration. The water with which the experiments were conducted was clear as a result of storage, and the physical character, bacterial efficiency and reduction of organic matter were exactly similar in every respect as when alum was being used continuously.

It is accordingly concluded that rapid sand filters, when filtering waters which are not turbid, reach their maximum filtering efficiency

after having been fed with alumed water for an hour only, and the use of alum thereafter can be altogether dispensed with without in any way impairing their efficiency. A considerable reduction in the expenditure on alum might thus be effected.

GOVINDA RAJU (V.). **Observations on the Working of Slow Sand Filters.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 33–39. [1 ref.]

An investigation extending over several years in the Madras Presidency by CUNNINGHAM and RAGHAVACHARI (1920) led to the conclusion that slow sand filters yield a purer filtrate than mechanical filters, and the general conclusions have always been in favour of the slow sand filter. The preliminary storage and settlement associated with this type of filter is a valuable asset, as the water reaching the filter has undergone some purification and has been freed to some extent from the susceptible pathogenic organisms. A temporary breakdown in the filtration process is therefore less likely to be attended with serious consequences than in the case of mechanical filters, where the period of storage is too short to be of great use. The continuous dosing with alum in the mechanical type is an expensive item and is really wasteful, as the waters of India during the greater part of the year are practically free from any appreciable amount of suspended matter, or if present at all, it is easily precipitated in the course of one day's storage without any coagulant. The cost of land does not militate against the adoption of the slow sand type, as land is generally available at a low cost.

Filters at the Hoogly-Chinsurah waterworks and at the Calcutta waterworks were selected for observation, the latter differing from the first-named in having no device for adjusting the rate of filtration accurately and the storage being less owing to silting up of the settling beds.

As regards the bacterial efficiency of slow sand filters at different times of the year, it was found that there was marked seasonal variation; in the case of the filters at both places the bacterial efficiency was lowest during the rainy season, and reached a fairly high standard during the rest of the year.

During the monsoon season the water carries a large amount of silt which is difficult to precipitate with the small amount of alum usually added and the short period of storage ordinarily permitted. This results in an accumulation of inorganic silt on the sand surface which proves fatal to the formation of a vital layer and is the cause of the low bacterial efficiency noted. Another disturbing factor is the scraping of the sand surface, after which the filter usually takes two and sometimes three days to recover its ordinary bacterial efficiency. When the sand bed is replenished with fresh sand it takes the filter more than a fortnight to attain even a moderate degree of efficiency.

In European countries it has been empirically found that a good filtered water should not contain *B. coli* in 50 cc. of water, nor a bacterial count higher than 100 per cc. A critical study of Calcutta shows that before the introduction of a piped water supply a considerable number of deaths from cholera and diarrhoeas was due to the polluted river water, and that the filtered supply has led to an immediate reduction in deaths from these causes. Bowel complaints are most prevalent during dry weather conditions, and analyses

of the standard of purity during this season showed the following :—

No lactose fermenters in 60 cc.	.....	80 per cent.
No lactose fermenters in 10 cc.	.....	98 per cent.

From the above it follows that filtrates from slow sand filters under Indian conditions should conform to a minimum standard of no lactose fermenters in 10 cc. of water.

Suggestions are given as to improvements in the present-day methods of working of the slow sand filters.

The running to waste of the water for a day or two after the periodical scraping of the top of the sand surface is considered as wasteful, and it is recommended that this water should be chlorinated and admitted into the clear water reservoir. It was found that the newly scraped filter was quite efficient in removing organic matter and that the filtrate was physically satisfactory immediately after scraping the sand surface.

After remaking the beds with fresh sand the present practice is to run to waste for a fortnight to three weeks. It is suggested that the sand bed be sterilized by passing through it for a few hours water containing a slight excess of chlorine, and that thereafter the filtrate be chlorinated as in the manner suggested for the filters newly scraped.

A careful study was made of the relation subsisting between high loss of head and bacterial efficiency of filtrate, and the conclusion formed was that so long as no violent fluctuation in the rate of filtration is allowed to occur, the filtration process proceeds quite smoothly in spite of the high loss of head and the latter should not therefore be regarded as an argument for closing the filter.

In order to prolong the life of the filters it is thought the practice of chlorination of unfiltered water to keep down algal growths should be given serious consideration.

Improved methods of gauging the rate at which the water is passing through the filter beds are necessary ; at present this is gauged by shutting off the inlet pipe and observing the linear drop in the level of the water on the filter bed. This method leads to very inaccurate results and beds have frequently been found to be working at only two vertical inches per hour when they were thought to be working at four. The simplest and most satisfactory arrangement that the writer has seen is the provision in the filter well of a floating syphon tube for drawing water, the arm of the syphon tube being also provided with a diaphragm for constricting it or widening it.

The substitution of continuous settlement for the present method is recommended, baffle-plates being arranged to direct the water from chamber to chamber.

As to the best method of adding chlorine it is held that the most advantageous is to combine the alum and the bleaching powder in one tank and to run in the combined solution into the raw water as it falls into the settling tank. It is held that the addition of chlorine to the clear water reservoirs involves lack of knowledge until the next day as to whether the dose has been effective or otherwise, unless an excessively high dose is given. By the means suggested it is possible to examine the water as soon as the settling tank is filled, and have a result the next morning before the water is led on to the filters. This method has been satisfactory in the case of the Hoogly water, which contains only a small amount of organic matter, especially after settlement.

Wolff (L. K.). **Over een filter, dat ook bij tropische temperatuur steriel water levert.** [A Filter which passes Sterile Water even at the Temperature of the Tropics.]—*Nederl. Tijdschr. v. Geneesk.* 1925. Apr. 4. 69th Year. 1st Half. No. 14. pp. 1590–1598. With 1 text fig. [5 refs.]

The filtrating medium is the so-called "Norit," a vegetable carbon activated (*i.e.*, rendered highly absorbent) by heating in an atmosphere of hydrogen or carbonic acid. The filter already constructed by Gryns with this substance has been improved by the author. After preliminary filtration to remove the loam and humus, which would clog the pores of the filter, the water passes a column of Norit of 15 by 15 cm., acidulated by hydrochloric acid. The filtration occurs at a temperature of 35° C. The water is passed at a rate of 1 litre per hour and is sterile for a fortnight, even if the original fluid was highly polluted (description of various bacteriological examinations). After this period the Norit must be renewed. The quantity of Norit which passes 14 by 24 litres of sterile water is sold at a cost of 1 florin Dutch (1s. 8d.), and is ready for use. The price of the filtering apparatus is not stated.

N. H. Swellengrebel.

Connolly (Joel I.) & Gorman (A. E.). **The Supplying of Drinking Water to Vessels in the United States.**—*Public Health Rep.* 1925. May 22. Vol. 40. No. 21. pp. 1042–1055. With 6 text figs. & 17 figs. on 7 plates.

By no means the least important public health factor concerned with vessel sanitation is the safety of the ship's water supply. At sea, water from overboard cannot be used for drinking purposes on coastwise vessels without distillation; in the Great Lakes the waters are generally of a high degree of purity, but subject to serious local pollution in the vicinity of cities. Two distinct divisions of the water problem may be recognized: (1) Where water is obtained from sources ashore; and (2) where it is obtained from overboard.

Water supplies obtained from ashore.

Given a satisfactory source (a safe water) the question resolves itself into one of getting the water aboard in a sanitary manner and of storing and distributing it so that its quality will not be impaired.

One source of danger is the occasional presence of a dual system of supply on docks and in shipyards permitting of a mistake being made in hydrants. On the Lakes the practice has been to identify hydrants by painting those supplying drinking water white, and those delivering water for other purposes red.

A second possible source of danger is the medium used for transporting the water from the hydrant to the vessel. Where delivery is made by hose the exercise of ordinary care should suffice. Where, however, the vessel cannot come alongside to enable connexion with a shore hydrant, some form of water boat becomes necessary. A well-designed water boat should be supplied with special drinking-water supply tanks entirely separate from the hull of the boat, and also have independent pumps for delivery purposes and no overboard

or bilge connexions of any kind. A practical difficulty has been that, because of the use of these vessels as auxiliary fireboats, owners insist on having overboard connexions to the pumps.

When the dock is fixed, hydrants are easily arranged; but complications arise when the dock must be moveable with the rise and fall of the water. In the former case they may be conveniently situated above the wharf floor and sufficiently close to the edge to permit a short hose to reach the vessel. The hose connection should point downwards to insure cleanliness. A short hose pipe is desirable to guard against the danger of having the end of the hose drop into a polluted harbour.

At river docks the wharf usually floats and is connected to the shore by a landing stage. The usual provision consists of a pipe line from the shore end of the landing stage to the river side of the wharf boat where the vessels dock. Each end has a hose coupling, the outer one for the short hose to the vessel and the other for a similar short hose to the nearest series of hydrants on shore. The shore

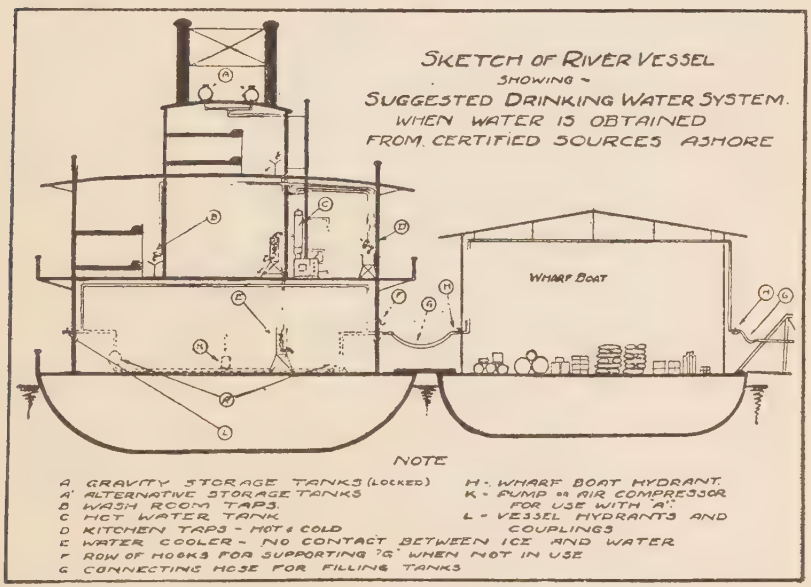

SKETCH OF RIVER VESSEL
SHOWING
SUGGESTED DRINKING WATER SYSTEM.
WHEN WATER IS OBTAINED
FROM CERTIFIED SOURCES ASHORE
WHARF BOAT
NOTE
A GRAVITY STORAGE TANKS (LOCKED)
A' ALTERNATIVE STORAGE TANKS
B WASH ROOM TAPS.
C HOT WATER TANK
D KITCHEN TAPS - HOT & COLD
E WATER COOLER - NO CONTACT BETWEEN ICE AND WATER
F ROW OF HOOKS FOR SUPPORTING 'G' WHEN NOT IN USE
G CONNECTING HOSE FOR FILLING TANKS
H - WHARF BOAT HYDRANT.
K - PUMP OR AIR COMPRESSOR FOR USE WITH 'A'
L - VESSEL HYDRANTS AND COUPLINGS

Fig. 57.—Section showing system for conveyance of drinking water from certified sources ashore to a river vessel alongside floating wharf boat.

hydrants are placed at different levels so as to allow of a short hose at any level of the water, and are in boxes below ground so that they do not interfere with either road transport or shipping when submerged.

A hose pipe should be reserved for filling drinking-water tanks and it should be properly identified. It should be provided with screw couplings at both ends, and when not in use should be stored on a reel in a clean container either on the dock or on the vessel, preferably the latter.

Before the above arrangements were made, drinking water was taken aboard in barrels, milk-cans, or any other receptacle that fancy or convenience might suggest.

As regards storage and distribution on board ship ; the pipes should run to the sides at convenient places ending in down-turned hose couplings which are so located as to permit of a minimum length of hose to reach the dock hydrant. Coupling points should be well above the deck and capped when not in use. Many vessels have the pipes of the drinking water service painted blue to distinguish them and to guard against accidental cross connexions with other water pipes.

If gravity tanks are exposed they should be protected against freezing by insulation or steam pipes, and unless locked and identified by recognized signs they should not be in proximity to other tanks. They should be provided with vents ending in goose-necks (pipes with ends bent downwards) and overlapping lids.

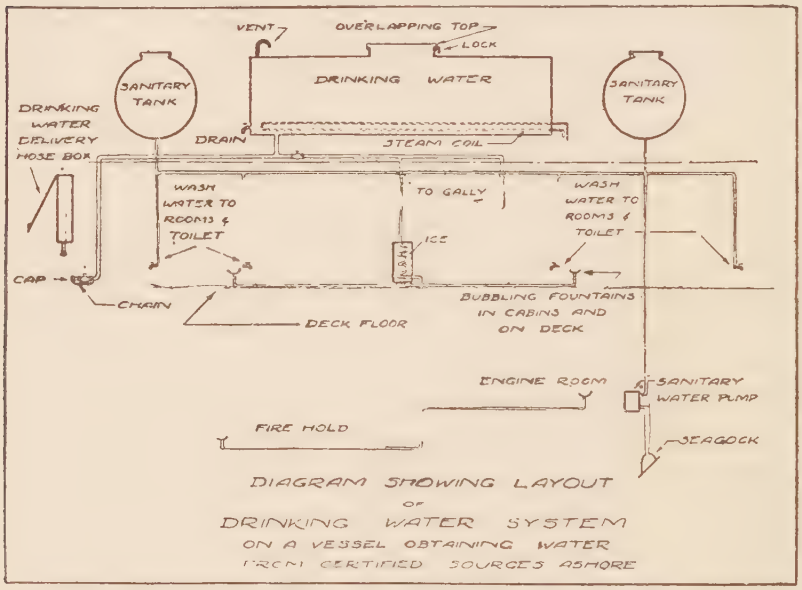


Fig. 58.—Section showing layout of drinking water system on a vessel obtaining water from certified sources ashore.
[Reproduced from *Public Health Reports*, Washington.]

Tanks in pressure systems are usually in the fore or after peaks or in the shaft alley between the engine room and the stern. Drinking water tanks should not be formed even in part by the hull, decks, or bulkheads of the vessel, lest the loosening of a plate permit the entry of polluted harbour or bilge water. The passage of drainage or soil pipes through the tanks was at one time fairly common, but it is now a thing of the past.

For cleansing, the tanks should be provided with proper drains situated above the level of the bilge water. If entrance to the tank is by a deck manhole, the collar should extend above the deck several inches to protect the opening. The cover of the manhole should be watertight, with a plate and gasket bolted to a flange. Tanks should not be located very close to boiler rooms ; the forward compartments and the shaft alley are suitable places as they are usually cool. Peak tanks, forward or aft, are usually undesirable because it is a common practice to put the lavatories for the crew on the main deck above them.

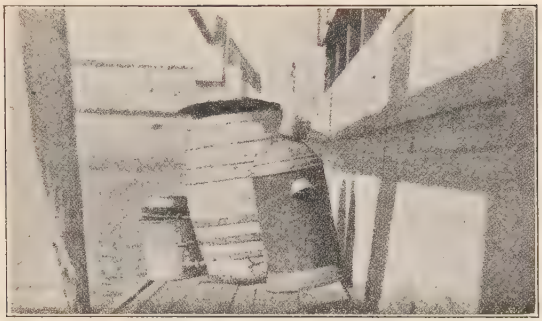


Fig. 59.—The Old.—Drinking water was formerly stored in such containers as these, open or with removable covers, from which the water was dipped with the common drinking cup. The ice was in contact with the water.

Fig. 60.—The New.—Present-day bubbler fountain supplying pure drinking water, cooled by passing through a coil of pipe in the ice box. The water does not come in contact with the ice. (Type of fountain now recommended is that having angle jet, protected orifice, and sanitary guards.—Ed., *Pub. Health Rep.*)

Fig. 61.—Landing stage at Paducan, Ky., wharf boat, showing pipe line with hose connected for supply of water.

Fig. 62.—Detail showing flexible permanent connection of pipe on wharf boat with pipe on landing stage, necessitated by the raising of the stage. Paducan, Ky.

[Reproduced from *Public Health Reports*, Washington.]

Fig. 63.—Levee [quay] at Memphis, Tenn., showing a flush hydrant, with cover removed, near the end of the landing stage, ready to be connected by hose to the pipe on the landing stage leading across wharf boat to steamer.

Fig. 64.—Levee at Cincinnati, Ohio, showing hose conducting water from the flush hydrant in the foreground to the pipe line along the bottom chord of the landing stage.

Fig. 65.—Pittsburgh levee during construction of pipe line for vessels. Dotted lines show the arrangement of pipes below the ground surface, with risers at intervals leading to hydrants flush with the surface. This use of flush hydrants avoids interference with trucking on the incline.

[Reproduced from *Public Health Reports*, Washington.]

Fig. 66.—Hydrant on dock, as used on the Great Lakes and the sea coast. Short hose extends to pipe on vessel alongside of dock. This view shows the desirability of having short hose in order to avoid having one end fall into polluted harbour water. Detroit, Mich.

Fig. 67.—Storage tanks for gravity distribution system. Overlapping covers are locked. Where tanks are in close proximity to each other, as they are here, drinking-water tanks are identified by signs.

[Reproduced from *Public Health Reports*, Washington.]

Tanks are usually made of steel and will require protection from rust, especially where distilled water is stored; coatings of cement grout, bituminous material, enamel or glass may be used. After entry for cleansing purposes the tanks must be sterilized; 1 lb. of calcium hypochlorite to 5,000 gallons is commonly used for this purpose, followed by thorough flushing to get rid of the taste.

Water cooling must be so arranged that the ice does not come into contact with the water. Two methods are in common use: (1) A coil pipe in an ice-box, preferably close to the place where water is drawn; (2) a scuttle-butt in connection with the refrigerating machine and a special circulating system for ice water, having its own pump.

A number of serious epidemics have been traced to cross connexion between drinking and other water systems on vessels. The danger is an insidious one because of the extensive system of pipes on large vessels and an accidental cross connexion may easily arise. The most common location for these has been somewhere in the boiler or engine rooms. Cross connexions are expressly forbidden by regulation.

Water supplied from Overboard.

Water taken on vessels from overboard is delivered through sea cocks. Sea cocks being below water line always have a positive pressure on their valves and tight connections are needed to prevent seepage. Harbour waters are invariably grossly polluted, therefore the sea cock is always a dangerous connection to any drinking water system. Even in the outer waters of the Great Lakes the taking on of drinking water from overboard is fraught with danger. Vessels usually ply on well defined courses, and during the heavy shipping season there may be distinct lanes of pollution along these courses.

Sea cocks for drinking water should be separate from all other sea cocks and should be situated forward of all toilet outlets or at least on the opposite side of the ship from such outlets. They should not be connected to long lines of horizontal piping, for the fouling of such is difficult to correct. It is a good practice to have double valves on all sea cocks serving a drinking water system and to have an open

valve or "weep pipe" between them to give warning of any leak in the outer valve.

Storage tanks are usually in two groups: one for the raw water and the other for treated water. All units should be in duplicate.

Water Treatment Methods.

Distillation is the common method of treatment on the Great Lakes freight vessels and inland river vessels. Because of the cost of production the supply is usually limited, necessitating a second source of supply for ablution purposes, which at best is an undesirable arrangement.

Other methods of treatment of "overboard water" for drinking are by ultra-violet rays, by ozone and by hypochlorites. Ultra-violet rays are used on 33 large passenger vessels of the Great Lakes fleet; where properly operated this method has given very satisfactory service. On two Great Lakes' passenger vessels and two Mississippi River excursion boats ozone treatment is employed. Where mica dielectrics are used instead of glass, and the contact of ozone and water is sufficiently prolonged and intimate, satisfactory results are obtained.

Last year the installation of the hypochlorite method was made on certain vessels. The stock solution of sodium hypochlorite is delivered at the desired rate in proportion to the pumpage, through an injector supplied by a revolving disc geared to a water meter. The disc, which dips into the hypochlorite solution, contains, in its periphery, a series of holes which, owing to surface tension, retain definite quantities of the solution, depending on the diameter of the hole. Serious objection as regards taste of the water have not so far been reported.

Ultra-violet rays, ozone and hypochlorites can economically produce a safe water in sufficient quantity for all domestic purposes on board ship; this is a distinct public health advantage, as dual water systems are potentially dangerous.

FOOD.

Hartwell (Gladys Annie). **A Comparison of Dried, Evaporated, and Fresh Cow's Milk.**—*Brit. Med. Jl.* 1925. June 13. pp. 1073–1075. With 2 charts in text. [6 refs.]

In these experiments rats were used, commencing when the animals were just weaned (three weeks old). The experiments were continued for 22 weeks, during which time several litters were born and reared; it was considered that a more searching test as to the adequacy of a diet is obtained by including gestation and lactation than if the actual period of growth is only investigated. White bread without crust (one day old) was provided with the different kinds of milk. Evaporated (condensed unsweetened) milk was diluted in accordance with the directions on the tin; in the case of dried milk 12 grammes of the solid were mixed with 100 cc. of water. The proportions given were 15 grammes of crumbled white bread to 36 cc. of liquid; the animals were given plenty of food, the ration being increased whenever necessary.

The conclusions are as follows :—

1. Dried milk as compared with fresh milk.
   (*a*) The initial rate of growth of the young rats was more rapid, but the final weight attained was practically the same.
   (*b*) The weight of the young on the second day was slightly better ; that is, dried milk appears to be a better food for gestation.
   (*c*) The suckling rats had thicker and silkier coats if the mothers were fed on the milk diet throughout their lives, but when the milk diet was only fed during lactation (that is a good mixed diet given during gestation), there was no apparent difference in the sucklings.
2. Evaporated milk as compared with fresh cow's milk.
   (*a*) The rate of growth of the young rats was less rapid, and the final weight attained was less.
   (*b*) The weight of the young at birth was less satisfactory.
   (*c*) The weight of the young at weaning was lower. This applied equally to the baby rats of mothers fed on a good mixed diet during the gestation period, or on the milk diet throughout their lives.

Accordingly, the dried milk appeared to be quite equal in dietetic value to fresh cow's milk ; if there was any advantage it was in favour of the dried variety. The evaporated milk compared less favourably with fresh cow's milk.

HENDERSON (J. B.) and HURWOOD (A.S.). **The Uniform Standard for Infants' Food.**—*Health.* Melbourne. 1925. May. Vol. 3. No. 3. pp. 75–81.

Since the establishment of standards for foods and drugs there has been no food which so much required standardization as to quality and labelling as infants' food. None of the standards so far adopted for the composition of infants' food by any of the Interstate Conferences on Food Standards have been at all satisfactory.

Undoubtedly by far the greater proportion of these foods is given to infants without any reference to a medical practitioner ; provision is therefore necessary for such directions in the labelling as will ensure an average infant receiving a food supply which is sufficient both in chemical constituents and in daily quantity.

Samples of nine popular varieties of infant foods were examined, being made up in accordance with the directions for an infant aged one month, and it was found that not one of them would pass any of the standards adopted by the Interstate Food Conferences. Cow's milk also fails to pass the standards owing to its normal protein content being much higher than that of human milk. As several of the infant foods on the market are undoubtedly valuable preparations, it is obvious that these standards are unworkable, even though the last Conference in Sydney in 1922 allowed a 35 per cent. variation from the official composition of human milk.

The following suggested standard, while adhering as closely as possible to the standard last officially suggested, provides for several points which require attention.

Infants' Food.—Infants' food is any food described or sold as suitable for infants. It shall not contain any woody fibre or any mineral substances insoluble in decinormal hydrochloric acid, nor any preservative, and shall be free from rancidity.

Labelling.—No person shall sell or describe any food as suitable for infants unless there is written on the label legibly and prominently the following information :—

(*a*) The date when the food was packed.

(*b*) A statement showing the percentage composition of the food when prepared for an infant aged one month in accordance with the accompanying directions ; a statement of the source of the proteins and fats, and the nature of the carbohydrates present.

(*c*) A statement showing the average percentage composition of human milk.

For the purpose of this regulation the average percentage of human milk shall be deemed to be :—

Proteins...	1·5 per cent.
Fat	3·5 ,,
Lactose	6·5 ,,
Mineral matter	0·2 ,,

(*d*) A statement showing the number of calories yielded by the food recommended to be given per day at the age of one month ; and a statement of the average number of calories required by an infant aged one month, which for the purposes of this regulation shall be taken as 400 calories.

(*e*) The statements of percentage composition and of calories required in the foregoing paragraphs shall appear in the following form :—

	Human Milk.	Name of prepared food.
Proteins...	1·5	—
Fat	3·5	—
Lactose	6·5	—
Other carbohydrates	Nil.	—
Ash	0·2	—
Calories from 1 day's food	400	—

(*f*) Exact directions as to the method of preparing the food.

(*g*) A statement of the average amount of prepared food to be given to an infant at one time, and the number of times such amount is to be given per day ; such statements to be given for each month of age up to six months.

Provided that the above statements (*b*), (*c*), (*d*), (*e*), and (*g*) need not appear if the label contains the words " Unsuitable for infants under the age of six months," in bold-faced sans-serif capital letters, of not less than six points face measurement.

The erratic nature of the " teaspoon " directions raises the question of requiring every manufacturer to provide a measure with the packet of food. This has frequently been suggested, and such measures are already supplied by several manufacturers.

It was thought that the publication of the foregoing might create more interest in this important subject, and lead to useful criticism ere the final adoption of a definite standard.

Whittaker (H. A.), Archibald (R. W.) & Shere (L.). **Relative Efficiency of Methods of Sterilization of Milk Bottles at Pasteurization Plants in Minnesota.**—*Public Health Rep.* 1924. May 2. Vol. 39. No. 18. pp. 923–929. [2 refs.]

The high bacterial content of bottles at plants where no provisions were made for their sterilization shows the need of proper sterilizing

facilities. In plants where the method of cleansing consisted of submerging the bottles in sodium carbonate solution, then placing on a revolving brush and a final rinsing in warm water, the average bacterial content was 542,300 organisms.

Results obtained on the sterilization of bottles with an apparatus using steam as compared with chlorine solutions indicates that chlorine is more dependable in routine practice at the plants investigated. This is specially evident at the smaller plants where manually operated apparatus is used.

Steam, when properly applied with automatic machines, gave satisfactory results, but in many cases the operators neglected to carry out certain details which are necessary to accomplish effective sterilization.

No objections have been reported as to odours or flavours being imparted to the milk, nor has any misuse of the chemical been observed where chlorine has been used for the sterilization of bottles for a considerable period. The preparation of the chlorine solution is simple, and the chemical is inexpensive. The method places at the disposal of the plant operator a sterilizing agent which is always available for immediate use.

De (S. N.). **Infected Ice-Cream.**—*Indian Med. Rec.* 1925. June. Vol. 45. No. 6. p. 161. [3 refs.]

Using the methylene blue reduction test, which depends on Reductase reducing organic dyes to colourless compounds, the author found uniform results in milk examinations. These were as follows :—

1. Not decolorized for 6 hours or longer—milk good and contains less than 500,000 bacteria per cc.
2. Not decolorized in 2 hours but decolorized in less than 6 hours —average milk containing more than 500,000 and less than 4,000,000 bacteria per cc.
3. Not decolorized in 20 minutes, but decolorized in less than 2 hours—bad milk, and containing more than 4,000,000, but less than 20,000,000 bacteria per cc.
4. Decolorized in less than 20 minutes—very bad milk containing more than 20,000,000 bacteria per cc.

In the preparation of ice-creams the milk is boiled, but numerous opportunities occur for contamination during manufacture, especially in insanitary premises. The putrefactive processes thus set up may accordingly be recognized by the application of the above reduction test. Infection with specific organisms is commonly accompanied with infection by putrefactive bacteria, and these latter will provide evidence of their presence on the application of the test. Samples of ice-cream which respond positively to the methylene blue test should be rejected.

La Favre (H. B.). **Epidemiological Report of an Outbreak of Food Poisoning which occurred in the First Battalion, Sixth Regiment, United States Marines, in Camp at the United States Naval Station, Guantanamo Bay, Cuba.**—*U.S. Nav. Med. Bull.* 1925. June. Vol. 22. No. 6. pp. 721–729.

While the camp was in quarantine on account of diphtheria an outbreak of food poisoning affecting 92 men occurred.

The clinical symptoms, though varying in intensity in different individuals, were similar in all cases. No ocular symptoms except slight dilatation of the pupil was noted.

From certain of the cases on bacteriological examination of blood, stools and urine, an organism was recovered which so far as the laboratory facilities of the camp permitted gave reactions of *B. paratyphosus B.*

An analysis of the foodstuffs consumed directed suspicion to fresh Cuban beef, but, unfortunately, none of the material was available for examination, as the remains had been disposed of. The hygiene of the cookhouse was apparently satisfactory, and neither rats, cockroaches, nor other vermin had access to the food. Flies were not prevalent, and the galley was comparatively free.

CONSERVANCY.

Temple (F. C.) & Sarangdhar (V. N.). **Jamshedpur Sewage Disposal Works with Special Reference to the Activated Sludge Plant.** —pp. 61–88. [The Institution of Engineers (India).] With 1 folding chart, 2 folding plans & 4 figs.

This account is of interest, especially as it gives details of the working of the Activated Sludge process under tropical conditions. The installation at Jamshedpur will be found mentioned elsewhere in this *Sanitation Supplement* where it, along with two other installations of the same type in the tropics, are dealt with. This communication, however, deals with the installation in considerable detail, and there are certain points which may be noted.

Among the defects from a tropical point of view it was found that the air distribution system, as originally designed, gave a great deal of trouble. A radical defect for this climate was the use of rubber washers for all joints; the rubber soon perished and the joints leaked. The difficulty was overcome by replacing the rubber with lead.

It is difficult to define the characteristics of a good sludge in precise terms, and little more can be done than give descriptive notes. A good sludge should be chocolate brown in colour, free from appreciable smell of an offensive nature, and when quiescent should settle within 15 minutes. The supernatant liquid should be clear and non-colloidal, and on analysis should show nitrification. If nitrates are present the sewage has been well blown: a well blown sludge under the microscope is found to be full of bacteria and to contain a few protozooa. Among the bacteria present, those that form nitrates and nitrites are the most important, and should number 100 or more per cc. of the effluent.

When the sewage is underblown, either because the capacity of the tank is too small to allow a sufficient period of aeration, or because of mechanical trouble, or obstructions in the diffusers, the sludge deteriorates. It gives off an offensive smell, changes from a chocolate to a dark black colour, and takes a very long time to settle. At the same time the supernatant liquid, instead of being clear and transparent, becomes colloidal and sticky. Sometimes a sludge assumes a texture known as "ropy," and such under the microscope shows a large growth of protozoa, very sluggish in movement, and not so active as those in a healthy well-blown sludge. Unhealthy sludge may temporarily

produce a satisfactory non-putrefactive effluent, but if the cause of the deterioration is not removed, a serious breakdown of the whole process will occur.

When the sewage is overblown, which occurs when the quantity to be treated is too little for the tank, the sludge burns out and diminishes in volume, and the effluent becomes colloidal.

It has been established that there is a minimum and a maximum period of aeration for any particular sewage. There is also a minimum and a maximum percentage of sludge to be introduced in the sewage if a stable and clear effluent is to be obtained. Each sewage will require separate consideration and will demand its own appropriate treatment in the above respects, but in both relations there is a wide margin within which good results will be obtained. In the case of the Jamshedpur sewage it was found after experiment that the volume of sludge to sewage could vary between 10 and 20 per cent.

As to the period of aeration the time was gradually reduced under careful observation until the aeration period came down to 6 hours. This factor will again vary according to local circumstances, and must be determined for the particular sewage to be treated.

Some experiments were made on drying sludge in the sun. It was found to dry very well on turf provided the depth of the sludge layer did not exceed 3 inches. Drying on sand was found unsuitable because, though the sludge dried rapidly, it penetrated the upper layers of the sand, which became incorporated in it, thereby lowering the percentage of nitrogen per volume of dried sludge. A 3-inch layer of sludge dries on turf to a spadable condition within 6 hours, and within 24 hours it is quite dry in flakes, varying from one-twelfth to one-eighth inch in thickness which can be easily handled. In 3-inch layers it dries well on a cement floor. Dried sludge has been kept for a period of two years in a stoppered bottle without showing any signs of deterioration or developing an offensive smell. The value of the dried sludge as a fertilizer has been amply demonstrated by carefully observed experiments extending over two years.

Anyone considering the installation of an Activated Sludge method of sewage disposal in the tropics will gain much useful information from a study of the paper in the original.

Fowler (Gilbert J.). **The Activated Sludge Process in India and the East.**—*Trans. of the Internat. Conference on San. Engineering.* The Institution of Sanitary Engineers. London. 1924. pp. 122–125.

East of Suez there are, it is believed, installations in operation only at Jamshedpur near Calcutta, at the Indian Institute of Science in Bangalore, and in Shanghai. The plants are all designed on what is known as the "diffused air" system. There are proposals for the installation of similar types of plant in other parts of the world, for instance, at Hankow, the Federated Malay States, etc.

Jamshedpur.—

The installation is designed for 3,000 people at 38 gallons per head, giving a dry weather flow of rather more than 100,000 gallons per day. The tanks are arranged to give six hour's aeration in three units, each designed to deal with 50,000 gallons on the basis of six hour's aeration, thus giving a margin of 50,000 gallons over the dry weather flow of 100,000 gallons. From the first the works have given excellent results, though they have regularly received more sewage than they

were designed to treat. The sludge and effluent have been used to irrigate what was practically desert land, and some 40 to 50 acres have been brought under luxuriant cultivation, the chief crops being market produce and sugar cane. The land, originally of a barren sandy nature, has acquired a good tilth.

Indian Institute of Science, Bangalore.—

The installation was designed for 200 people at 30 gallons per head. As a matter of fact about 450 persons contribute to the sewage which should reach the tanks, but chemical analysis indicates that only a certain proportion of the urine enters the sewers. The plant has been used for experimental work of various kinds, and the conditions have been made at times purposely unfavourable, particularly in regard to the air supply. Inadequate air supply has been found to be the cause of many difficulties. It is possible, for a certain period, to obtain quite a good effluent with about half the amount of air which experience has shown to be necessary. Under such conditions, in the course of time, banks of unoxidized sewage form, and the quality of the effluent deteriorates rather suddenly, "bulking" of the sludge takes place, and the whole process is disorganised. Moreover, insect larvae, particularly of *Chironomus*, appear in quantity in the slowly moving sludge and completely alter its physical characteristics. With an adequate supply of air none of these troubles arise, and an excellent effluent is constantly obtained. "Bulking" has been found to be due to filamentous bacteria rather than to protozoa, though numerous forms of the latter may be present. The experiments have been of great interest as showing the close analogy between the forms in activated sludge and in arable land, and their variation with conditions of aeration, temperature, and season. The effluent and some of the sludge have been used for irrigation purposes and excellent crops of cabbages, chillies, vegetable marrows and other market produce have been raised on what was formerly jungle land. No nuisance of any kind has arisen either from the tanks or the irrigation area. It has been found that the routine oversight of the plant can be entrusted under general instructions to illiterate Indian subordinates.

Valuable experimental work has been done on the fermenting together of leaves and house refuse and activated sludge, with the production of an excellent manure rich in humus. Certain conditions for success have yet to be worked out in detail, but there is good reason to hope it will be possible to solve at once the problem of disposal of activated sludge and of house refuse.

Shanghai.—

The City has been accustomed to receive a revenue of £40,000 per annum by the sale of night soil; nevertheless, under the closely packed conditions of a modern city, an insistent demand arose for a water carriage system. It has been decided to construct three disposal works on the activated sludge system. The works for the central area are in the course of construction, and the first set of aeration and sedimentation tanks were completed in 1923 and put into operation with satisfactory results. It appears that the Chinese cultivator willingly makes use of activated sludge as a fertilizer.

In conclusion, it may be stated without hesitation that the activated sludge process has shown itself applicable to tropical conditions, both for large towns and for small communities, and the hope may be expressed that it will play its part in the increasingly difficult problem of food supply for the large and increasing populations of the East.

By the adoption of the activated sludge process as a preliminary to land treatment it has been demonstrated that sewage farms may be established without nuisance and with the least loss of the manurial value of the water-borne sewage.

BOLTON (Joshua). **Elasticity of the Activated Sludge Process.**—*Trans. of the Internat. Conference on San. Engineering.* London. 1924. pp. 116–121.

Experiments were carried out, not with the idea of scientific research, but to see how the process would behave under rough usage. Small authorities may not be able to pay for highly trained managers, and it is probable that non-technical men may be in charge of small works and the care bestowed not all that could be desired. Such a state of affairs is likely to occur in the tropics, and any evidence as to power of withstanding improper treatment is of particular interest from this point of view.

The experiments have demonstrated that the process is a very elastic one and that it will withstand shocks, which ought not, but may, be applied to it.

The plant subjected to experiment was that at Bury, Lancs. Owing to circumstances not under control, it so happened that on one occasion the power supply was cut off for a period of four days. Anxiety arose as to what would happen to the sludge. The water in the aerating and settling areas remained clear, and when power was available after the four days' stoppage, the plant was put in action and the contents circulated for three hours. A little odour was noticed at the start, but this rapidly disappeared. Sewage was turned into the tanks and good results were obtained immediately. It is considered that sewage might have been admitted at once, without the three hours' circulation and aeration, and good results would have been obtained.

As it appeared wasteful in power to have the machines constantly working during periods of low night flows, and experience had shown that a lengthy stoppage did not jeopardize the process, it was arranged to have one of the tanks shut off for a period of eight hours each night. The results, instead of deteriorating, were actually better. This was confirmed by analyses covering a period of eleven weeks, during which the flow and the machinery was stopped for a period of eight hours each evening.

Experiments were made of the simple contact of activated sludge with sewage, crude sewage being taken and placed in a vessel containing 15 per cent. of activated sludge in an active condition. After being well mixed the sludge and sewage were allowed to stand for one hour to enable the sludge to settle. Analyses showed that remarkable purification takes place by simply mixing the sludge and sewage together without aeration or agitation other than necessary to distribute the sludge in the sewage. When a tank is in operation and the power is shut off, the suspended sludge gradually settles to the bottom and is doing effective work during the whole of its travel down through the liquid in the tank. There is, moreover, evidence to show that when a tank is stopped and after the sludge has settled to the bottom, purification is still taking place.

On one occasion whilst the surplus sludge was being drawn off, a mistake was made and an excessive amount of sludge was abstracted,

which reduced the quantity in the tank to below 5 per cent. Instead of the results falling off as might have been expected, they remained constant, and the plant was worked for a period of six weeks with 5 per cent. only of sludge. The results as shown by analyses were satisfactory. Experiments to ascertain how long sludge could be kept without aeration before becoming foul showed that six days elapsed before an offensive odour was developed.

GUTTERIDGE (A. Gordon.). **Memorandum regarding the Utilisation of Sea Water as the Transporting Medium in a Sewage Installation.** —*Jl. Roy. San. Inst.* 1925. July. Vol. 46. No. 2. pp. 42–46.

It has often been suggested that salt of brackish waters could be advantageously utilized as a flushing and transporting medium in a sewerage system, but uncertainty as to the effect that the salt would have on the sewage matter and on the operation of the sewage works has so far hindered the widespread adoption of this suggestion.

The problem as to utilization of sea-water as a transporting medium depends upon the following questions :—

The Action of Sea-water on Pipes, Fittings, etc.

It may naturally be expected that the corrosive action will be greatly increased over that occurring when fresh water only is employed. This corrosion will be particularly active during the earlier days of flow, but will decrease progressively as the interior of the pipes become covered with a protective coating.

The most serious corrosive action will occur in those metal fixtures and pipes the surfaces of which are alternately wetted and exposed to the air, such as the flush tank together with its ball, syphon, etc., and the down pipe to the closet pan. Corrosion will be especially marked at those junctions where two different metals come in contact owing to the electrolytic action induced by the sea water. This difficulty may be most easily overcome by moulding these fixings out of cement, or by coating all the exposed metal surfaces with cement or cement paint. As the pan, house drains and sewer lines are usually made of earthenware no corrosion in these will take place.

The Transporting Power of Sea Water.

Water which is strongly saline will not transport as much matter in suspension as will water that is not salt. Provided, however, that the sewers are laid with sufficient fall to give a velocity to the sewage of at least 3 ft. per second, and ample water is allowed for flushing, this factor is of no great moment.

The Action of Sea Water on the Sewage Solids.

Chemical action takes place between the salt in the water and the organic solids of the sewage, but continued experiment has failed to show that this reaction has any tendency to cause the sewage solids to assume a form in which they are more resistant to change than if fresh water is in use.

A much more important matter is brought about by the throwing out of solution of grease in a liquid or a semi-solid condition passing into the drains with kitchen waste. The reaction produces a marked scum on the top of the sewage and forms a thick and resistant coating to the inside of the sewers. The decomposition of this coating is

undoubtedly liable to give rise to offensive odours arising from the drainage system unless it is exceptionally well ventilated. The carrying capacity of the sewers will also undergo a steady diminution unless they are frequently cleansed.

At the treatment plant this scum tends to form a heavy and odoriferous layer on the surface of any tank and to choke all exposed openings and connections, leading to clogging of the plant.

The obvious remedy is to prevent the admission of the grease to the underground drainage system by the provision of adequate grease traps. Such are, however a continual source of trouble unless they receive constant attention for cleansing, and provision is made for the proper disposal of the grease that is removed. Traps may be installed on each house drain or at some point on the outlet sewer, when the trouble to be expected from this grease will be confined to the reaches of sewer above the points of installation.

The impression that over-polluted sea water becomes more offensive than fresh in the same condition may be well founded, since sulphides, and possibly organic sulphur, have been found in sea waters when over-polluted. As, temperature for temperature, the dissolved oxygen content of sea water is approximately 20 per cent. below that of fresh water, this would seem to indicate that putrefaction of the sewage will occur sooner with sea water as a transporting medium than if fresh water be used. The quantity of odoriferous gases given off during putrefaction will also be decidedly increased. If well aerated sea water be utilized in the first instance for the flushing of the closets, the time interval allowed by English authorities before putrefaction can take place is stated to be 10 hours.

The Action of Sea Water during the Process of Sewage Treatment.

The view is generally held that the salt or other constituents of sea water, while having a somewhat deterrent effect upon aerobic action, have on the other hand the effect of greatly increasing the numbers and the activity of anaerobic bacteria. Under anaerobic conditions, therefore, it may be expected that action will proceed more rapidly once it has been established, though some delay may occur owing to the protective coating given to the solids through the interaction of the salt and organic material. Aerobic action will undoubtedly be delayed, both on account of the lessened number of aerobic bacteria and by the smaller amount of oxygen available in a dissolved state in sea water. Additional burden will be thrown on the filters on account of unconverted ammonia compounds in the sea water which will undergo oxidation together with the sewage compounds.

On the other hand, sea water possesses the property of rapidly transmitting dissolved atmospheric gases from the surface of the liquid exposed to the air to those portions further removed.

Any difficulty that may be experienced from decrease of bacterial efficiency in the filter bed may be met by a decided increase in the area of the bed and a consequent diminution in the rate of application to it of the sewage liquid.

In conclusion, it is considered that sea water may be safely used as a transporting medium in a sewage installation under the following conditions :—

" (1) Where a cement is used as far as possible for all surfaces of fittings, etc., exposed to alternate ' wind and water ' action.

" (2) Where the grades of the sewers are such as to secure a thorough scouring velocity.

" (3) Where the grease content of the sewage is removed by suitable traps.

" (4) When the period during which the sewage is undergoing transportation to the treatment works is such that the total depletion of the oxygen dissolved in the liquid is impossible.

" (5) When the treatment works are so located that the additional odours arising from decomposition of the sewage solids in the presence of sea water, will cause no nuisance.

" (6) When the volume of the filter bed is suitably increased.

" (7) When the effluent from the filter bed can be rapidly diluted in some larger volume of well-aerated waters."

It is recommended that some form of sedimentation basin in which the deposited solids are allowed to digest out of contact with the supernatant liquid from which they were originally deposited will lead to more effective treatment. The Imhoff tank or some of its later variations should meet this recommendation.

In Malta two small installations employing sea water have been in use for the past 20 years and have given satisfaction.

Ross (G. A. Park). **Fly-Proof Latrines for Coloured Persons.**—*Jl. Trop. Med. & Hyg.* 1925. June 15. Vol. 28. No. 12. pp. 231–232. With 2 text figs.

The author finds that the essential element in promoting cleanliness is to have some portion of the latrine coming up between the legs and close under the buttocks, and also that when the latrine keeps itself clean there is no difficulty in enforcing its use always provided it is easy of access and close up to the coolie lines.

Illustrations are given of pail pattern and of a privy-pit pattern.

In each case the receptacle projects some 4½ inches above the floor. In the triangle pit privy pattern the aperture is 21 inches from back to front, 3 inches in front and 18 inches behind. The following instructions are usually sent out with this type :—

(*a*) Pits to be made in dry soil to a depth of 10 feet or over. The bacteriolytic action which goes on in a deep pit is very effective and such lasts for many years without having to be filled up.

(*b*) The pit must be completely covered over to prevent access of light. Flies will not penetrate a dark pit.

(*c*) A few spade-fulls of rich leaf mould thrown over the initial deposits of stercus are an advantage in setting up a desirable decomposition.

(*d*) In a large installation a urine trough leading to a separate pit is recommended.

(*e*) Di-chlorbenzol, a crystalline preparation (made by Messrs. Kynoch, Ltd., Umbogintwini, near Durban) gives off a heavy gas which is a perfect deodorant. A quarter of a pound of this hung inside the pit keeps the latter full of gas, which kills any smell and through which flies cannot penetrate.

(*f*) Should a pit become flooded it must be filled with earth above floor level and some oil waste might be set to smoulder while it is drying out. This will prevent any smell.

(*g*) No disinfectants should be used.

The author states that he has found it useless to arrange for self-closing lids. Natives simply put a stone under the hinge which is wrenched off as soon as anyone attempts to shut it down.

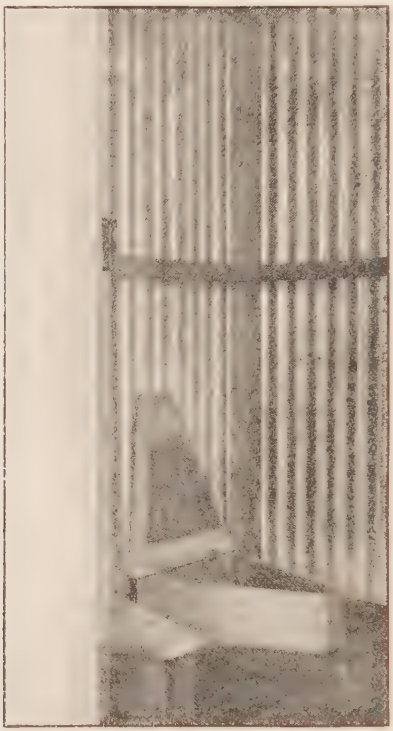


Fig. 68.—Type of pit privy, designed by Dr. A. A. Park Ross, largely used for coloured persons in Natal.

Fig. 69.—Photograph to illustrate the construction of a pail pattern latrine and the pit privy pattern, designed by Dr. Park Ross.
[Reproduced by permission from the *Journal of Tropical Medicine & Hygiene*.]

DISINFECTION.

King (H. H.). **The Stability of Solid Calcium Hypochlorite.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 191–194.

It is desired to bring to the notice of the English-speaking world a substance, solid calcium hypochlorite, whose advantages as regards concentration and stability seem to be at present most appreciated in Germany, where the material is manufactured. By calcium hypochlorite is meant a salt in which *both valencies* of the divalent calcium atom are satisfied by hypochlorite radicles, and which would thus have the formula $Ca<^{OCl}_{OCl}$. Whatever may be the real constitution of bleaching powder, the formula is fairly accurately expressed by Ca(OCl)Cl plus a varying amount of lime. Theoretically, therefore, solid calcium hypochlorite can have almost double the available chlorine strength of bleaching powder, and more than double, if there be but little lime present with the calcium hypochlorite as compared with the 33 per cent. or more present in "bleach." Thorpe's Dictionary of Applied Chemistry stated that it was made in Germany under certain patents and described it as a crystalline solid that contained 80 to 90 per cent. of available chlorine and that it was reputed to be stable.

Tins of the compound were received in Kasauli in January, 1924, and tests showed an available chlorine content of 74·4 per cent. The following examinations to test the stability were made. Five small glass stoppered bottle were half filled with calcium hypochlorite and the stoppers waxed down. The first (A) was put in a wood box and kept in an ordinary room cupboard. The second (B) was put in the dark into an incubator at 37° C. for 66 days, then in a box in a cupboard for 174 days during the hot weather, then put back into the incubator for 67 days. The third (C) was put on a shelf exposed to indirect light. The fourth (D) was shaken by a vaccine shaking machine for about 6 hours a day on 12 days in the first month after which it was put in a cupboard. The fifth (E) was put in a wood case open at the top and was left unstoppered on a shelf. At the end of 10 months the final readings for available chlorine were as follows :—

(A)	Cupboard in the dark	67·7 per cent.
(B)	Incubator 4 mths., cupboard 6 mths.	56 ,,
(C)	Exposed to light	66·7 ,,
(D)	Exposed to vibration	67·7 ,,
(E)	Exposed to air	24 ,,

The only factors that had any effect of note were heat and exposure to the air, but the latter is not a legitimate treatment. Seeing that it is very unlikely that the conditions of storage, so far as the effects of temperature is concerned, in any station in India over 10 consecutive months would be more severe in total effect than the conditions in experiment (B), it may be said that the deterioration there found probably represents the maximum deterioration likely to be obtained anywhere in India in 10 months.

Similar tests carried out with "bleach" stabilized with lime and "bleach" not so stabilized showed for the first-named a loss of strength corresponding more or less closely with the above, but in the case of

unstabilized "bleach" the resulting loss was very marked. By comparison both stabilized "bleach" and calcium hypochlorite are very stable substances to ordinary "bleach." It is considered that there is little doubt that the chief reason for the superior stability of these two substances is their dryness. Attention is drawn to the containers in which the calcium hypochlorite was packed; the tins were airtight through the use of a washer round the lids, and were painted with bituminous paint, thus preventing the deleterious catalytic action of rust.

Apart from its high content of available chlorine, this preparation of calcium hypochlorite has a distinct advantage over bleaching powders in that the proportion of free lime and extraneous matter is very low, so that a solution in water gives very little sediment. This property is of peculiar value in the chlorination of drinking water.

It is considered that the advantages of solid calcium hypochlorite are very great, it presents a disinfectant containing a very high percentage of available chlorine in a stable form, and requiring comparatively little consideration in transport, as it is on the average three times as strong as "bleach."

Lal (R. B.) & Tiwari (C. D.). **A Note on the Disinfestation of Houses by Fumigation with Cresol.**—*Indian Med. Gaz.* 1925. June. Vol. 60. No. 6. pp. 255–258.

The method in vogue in the Punjab for the disinfestation of houses for plague is by vaporizing commercial cresol on smouldering cow-dung cakes. Two ounces of cresol have been recommended to be used, and under instructions from the Director of Public Health an enquiry into the efficacy of the procedure was undertaken in August, 1924. The points studied were :—

The effects of fumigation of varying amounts of cresol on rats and on rat fleas in masonry and in mud houses; the fleas being :—

(*a*) In muslin bags; either directly exposed to the vapour or more or less protected.

(*b*) On living rats.

(*c*) Free in the room.

The following conclusions were arrived at :—

1. Cresol fumigation as ordinarily carried out has no effect upon rats, but has a definitely toxic effect upon fleas when either in muslin bags, free in the room, or on the bodies of rats. Two ounces of cresol is quite insufficient for ordinary rooms of 1,000 to 1,500 cubic feet capacity.

2. Household furniture and rat-runs afford effective protection to the fleas against the action of the vapour even when cresol is used in large quantities.

3. Fumigation with cresol tends to cause fleas to leave their hosts.

4. The toxic action of cresol vapour is more manifest at higher levels as compared with the floor level.

5. Slightly better results are obtained by vaporizing cresol on two heaps of cow-dung cakes instead of on one.

To make disinfestation by means of cresol effective the following recommendations were made :—

1. Remove all the furniture and sundries before disinfestation and thoroughly expose them to the sun.

2. Use 10 ounces of cresol in an ordinary room of 1,000 cubic feet capacity.

3. Preferably distribute the drug over two iron pans containing smouldering cow-dung cakes placed in different parts of the room.

4. It is expedient to arrange some mechanical means to prevent the vapour from directly rising up.

5. It is necessary to seal the room carefully before fumigation and to keep it closed for four hours afterwards.

6. It is expedient to wash the floor with phenyl solution after the disinfestation is over.

7. After disinfestation is completed, rat runs should be fumigated with *neem*-cartridges [see page 189] and then closed.

Without the help of the usual staff and under the rural conditions in the Punjab it would not always be possible to carry out these recommendations.

JUILLET (A.) & DIACONO (H.). **Emploi des extraits de "** ***Pyrethrum cinerarifolium*** **Trev." dans le traitement de la pédiculose du corps (*Pediculus corporis* de Geer).**—*Bull. Acad. Méd.* 1925. July 7. Year 89. 3rd Ser. Vol. 94. No. 27. pp. 778–779. [2 refs.]

The toxicity of extracts of pyrethrum for a variety of insects and their harmlessness to man have suggested their employment in pediculosis. Soapy suspensions of the extracts used at the first trials had but little action upon the louse and its eggs. If, however, the proportion of extract is made as high as 0·25 gm. per 100 cc. of the soap solution with 0·88 gm. of ethyl trichloride in addition, the effect is excellent.

Extraction should be effected by means of ethyl trichloride, and not by ethyl alcohol, ether, petroleum ether, or carbon tetrachloride. Extraction by percolation in the cold is of no value, as the extracts thus obtained are inactive. The soap used should always be one containing potassium in small amount and only slightly alkaline, so as not to destroy the activity of the pyrethrum. Soap containing soda should not be used. Potash soap and ethyl trichloride are by themselves quite without action, but they assist in clearing the chitinous cuticle of the louse and thus facilitate the penetration of the pyrethrum extracts.

The most suitable period of contact with the louse or its nits is 20 minutes. Under these conditions, *in vitro*, an aqueous solution (containing 16 gm. of a potash soap, 0·25 gm. of dry pyrethrum extract, 0·88 gm. of ethyl trichloride per 100 cc.) absolutely secures the destruction of lice and nits.

Twelve individuals detained in the civil prison at Sousse (Tunis) all heavily infested with body and head lice and nits were treated with the above compound. Their clothes were washed in the soap suspension and returned to the people after having been dried. No reinfestation was evident four weeks after treatment though the men were kept under observation and examined daily.

It is considered that pyrethrum extract as above compounded should prove a valuable agent for the prophylaxis of typhus and other maladies transmitted by means of the louse.

CHILD WELFARE.

HONE (Frank S.). **Review of the Present Position of Infantile Mortality.** —*Med. Jl. Australia.* 1925. May 2. 12th Year. Vol. 1. No. 18. pp. 443–449. With 11 charts in text.

Reviewing the course of events during the past quarter of a century the following propositions are put forward :—

1. There has been a very marked and for the most part a steady improvement in infant mortality.

2. Closer inspection of figures shows that this improvement has been almost entirely confined to the period of infancy later than the first month of life and has been due to a greater control of post-natal environment, especially with regard to the infections of the intestinal tract and to nutrition. Infections of the respiratory tract apparently remain constant.

3. Experience has shown that no one method is a cure-all, but that success depends on close attention to all the details of a child's life.

4. The mortality figures for the first month have remained practically unaltered ; any change has been, if anything, for the worse.

5. The causes of death in this early period differ from those in the latter period : the important factors are pregnancy and the puerperium, whereas in the second period they are food and flies.

6. The method of successful attack in the two periods must, therefore, be entirely different.

7. For the same definite advance in the reduction of mortality in the first year of life to be made during the next quarter of a century as has been made in the past, we must cease to think of infantile mortality as one subject, and rather think of : (*a*) Birth or natal mortality, including in this ante-natal and neo-natal factors ; (*b*) post-natal mortality.

If deaths in the first month of life are further analysed, it is found that the great majority occur in the first week ; their causation is therefore natal or ante-natal. Investigation shows that the two great factors at work are syphilis and slovenly obstetrics. The main causes of death in this period are prematurity, congenital debility, malformations and accidents of childbirth.

The influence of various conditions on the early deaths of infants is shown in the following table, according to Dr. Whitbridge WILLIAMS, in the United States :—

Complications of labour (including ante-partum haemorrhage and post maturity of the foetus)	51 per cent.
Syphilis	16 ,,
Toxaemias of pregnancy	10 ,,
Chronic renal and other maternal diseases	2 ,,
Placental states leading to relative placental insufficiency	6 ,,
Foetal deformities	5 ,,
Cause of death unknown	11 ,,

For the purposes of preventive treatment foetal deaths may be classified into four groups :—

(1) Those, the cause of which can be discovered during the ante-natal period and can be prevented by purely ante-natal treatment.

The great representative is syphilis; other examples are toxaemia of pregnancy and breech presentations.

(2) Those, the causes of which can be discovered during the ante-natal period, but which depend for their prevention on intra-natal methods. The best example is contracted pelvis; other examples are the toxaemias of pregnancy which do not yield to ante-natal treatment and (rarely) obstructive pelvic tumours.

(3) Those, the discovery of which is not possible in the ante-natal period, but which make their presence known just before or coincidently with the onset of labour or during the course of labour. Examples are the ante-partum haemorrhages (a prolific cause), prolapse of the umbilical cord and cases of prolonged labour from such causes as persistent occipito-posterior presentations. In this group most of the foetuses have cerebral haemorrhages and tearing of the septa of the dura mater consequent on delivery by forceps or version.

(4) Those of which the causes so far as our present state of knowledge stands, are not discoverable or preventible by any means whatever.

It is thus conceivable that about one-half the foetal deaths are preventible; that of these about 20 per cent. (of which three-quarters are due to syphilis) could be prevented by ante-natal methods alone, about 12 per cent. depend for their prevention on combined ante-natal and intra-natal methods and about 20 per cent. on intra-natal methods alone.

PEIRIS (S. J.). **La mortalité infantile dans l'ile de Ceylan.**—*Bull. Internat. Protection de l'Enfance.* 1925. June 30. No. 38. pp. 583–589.

The following table gives the mean for the years 1914–1923 of infantile mortality for Ceylon, compared with England :—

	Birth Rate per 1,000 inhabitants.		Infantile Death Rate per 1,000 inhabitants.	
	Ceylon.	England.	Ceylon.	England.
Mean for the 10 years ...	38·5	20·2	192	89

The number of deaths in the first year of life is more than half the total number of deaths among children up to five years of age.

The principal causes of infantile mortality during the current year were as follows :—

Causes.	Children under one year, percentage of deaths.
Convulsions	29·7
Debility	18·7
Prematurity	5·1
Diarrhoea and Enteritis	2·2
Bronchitis	1·0
Pneumonia	2·1
Tetanus	0·1
Other causes	40·8

As regards the regional distribution of infantile mortality, the Island was divided into three sections :—

1. The Urban Section, comprising the 33 principal towns and their suburbs.

2. The Estates, comprising plantations in which the inhabitants are mainly made up of European planters (in small number), of immigrant agriculturists and coolies who constitute the majority of the population.

3. The Rural Section, comprised of villages occupied by a rural indigenous population.

In the first two sections statistics could be accepted as accurate, but in the Rural areas they could not be so regarded owing to the paucity of medical men and the consequent inaccuracy of diagnosis.

In the principal towns, debility, convulsions, prematurity and gastro-intestinal ailments were the principal causes of infantile mortality, to which it is considered that artificial feeding contributes very largely.

In the estates more than one-half of the infantile deaths were due to debility, and the cause of this is held to be the poverty of the agricultural population. Convulsions and gastro-intestinal ailments were less in evidence than in the cities.

Convulsions following intestinal trouble was the main cause of death in the villages of the Rural Section.

An analysis as to the influence of race on infantile mortality resulted in the following :—

Death Rate per 1,000 of infants under 1 year of age :—

Nationality.	Average of five years.
Europeans	47
Burghers and Eurasians	145
Cingalese	176
Tamils	234
Moors	243
Malays	218
Other Races	194

VANDENPERRE (L.). **Les enfants indigènes au Congo Belge.**—*Bull. Internat. Protection de l'Enfance.* 1925. June 30. No. 38. pp. 539–555.

Infantile mortality is very heavy among native children in the Belgian Congo. In infants below 18 months of age the figure averages from 50 to 80 per cent., so far as it is possible to obtain statistics. Owing to the lack of care and precautions and to measures of abortion prenatal mortality also is excessive.

The native woman is a good mother ; she has the advantage of the white woman in that she is able, except in very rare cases, to feed her own child, which she frequently does until it is two or even three years old ; but she is devoid of all hygienic knowledge and care in the management of her first born, and she prefers the ignorance of fetich to the scientific advice of the European doctor.

The remedy for this state of affairs lies in education and instruction under the direction of an European woman, and the outlook is encouraging.

A statistical study of the diseases of children in the country and extracts from the reports of the Third International Colonial Congress at Ghent are appended.

INDUSTRIAL HYGIENE.

International Labour Review. 1924. Dec. Vol. 10. pp. 1005. 1028.—[**Labour Conditions and Labour Regulation in China.**] [Summarized in *Jl. Indust. Hyg.* 1925. June. Vol. 7. No. 6. p. 108.]

On the eastern border of China factory regulations and inspection are undeveloped, and the conditions of child labour are far from satisfactory. In Shanghai children are not infrequently worse off in the modern factories than in their native homes. Tuberculosis amongst them is prevalent. Purchase of young female children for domestic service is of common occurrence, and apprenticeship in small workshops at an early age is frequent. The conditions under which these children work may vary between virtual slavery and humane employment. In mills and factories children of not more than 6 years of age are at work for 12 hours a day with one hour off for a meal. Sanitary conditions are deplorable and wages exiguous. Mothers working in factories often bring their infants with them, and rows of baskets containing babies are to be found between pieces of rapidly moving machinery. White phosphorus is still used in certain match factories and cases of poisoning result. In laundries girls and boys start work at 13 years of age; the hours of work are unlimited, from dawn often until late at night.

Chen (T.). [**Labour Conditions in China.**]—*U.S. Month. Labor Rev.* 1924. Nov. Vol. 19. pp. 980–993. [Summarized in *Jl. Indust. Hyg.* 1925. June. Vol. 7. No. 6. p. 109.]

In the Yangtzepoo District, Shanghai, foreign mill owners in the cotton industry have established a free hospital and dispensary for their 15,000 employees. 55 per cent. of the workers are women and 20 per cent. children. Owing to the nature of the cotton industry most of the injuries are lacerations, 75 per cent. of which become infected. Accidents are most frequent among children, for they are inexperienced and tire easily under continuous employment. The trend of legislation is (1) the prohibition of children under 12 years of age, (2) one day's rest in seven, (3) the limitation of working hours.

Bouffard (G.). **Protection sanitaire de la main-d'oeuvre indigène en Côte d'Ivoire.**—*Bull. Soc. Path. Exot.* 1925. May 13. Vol. 18. No. 5. pp. 439–442.

According to the nature of the work required by the employer it follows that manual labour varies considerably; the class of labour may be relegated to several categories.

1. Administrative manual labour, such as occurs in the service of many public bodies. An important centre exists on the Ivory Coast in the railway workshops for the construction of the line towards Bobo Dioulasso. The railhead is at Katiola, where 1,800 native workmen are stationed. Medical attention is assured by the presence of an assistant surgeon and new workmen are examined on arrival and

on leaving. On arrival, those unfitted for the work expected of them are weeded out, and on leaving those with communicable affections are sought out and looked after. The feeding arrangements are made a special study by the medical officer, and the rations are varied as much as possible. Drinking water is often not an easy matter to arrange for; tank-wagons are employed to bring good potable water either proved by examination or purified by chemical treatment.

In August, 1924, out of an effective strength of 1,500 men, 50 admissions to hospital on account of dysentery occurred. This was believed to be of bacillary origin as emetine had no beneficial action.

2. Maritime manual labour consists of Kroo boys recruited for coastal voyages. These men are examined before embarkment and again on being disembarked. The effective strength of the Kroo boys is about 2,500. Every two or three months these men return to their own country, and thus present a constantly changing body liable to spread infection. There is need to organize at Tabou an observation camp sufficiently large to arrest the importation of transmissible affections. Owing to the absence of such an organization Tabou was infected with smallpox contracted on board ship in August, 1924.

3. Manual labour in forest land. This is found in a number of business concerns engaged in the exploitation of the valuable forest woods. Each of these works employ from 3,000 to 4,000 workmen. Recruitment is associated with the Administration, but there is no medical control owing to the paucity of medical personnel. As the majority of the workmen pass through Dimbokro it should be possible to arrange for some medical supervision at this place. On return from the employment the men also pass through Dimbokro. In most of the works first aid on account of sickness or accident can be obtained pending removal to the nearest organized medical depot. The attendants are the private servants of the firms concerned; in other cases attention is given by the Europeans employed in cutting the trees.

Pirow (H.). [**Underground Conditions liable to Affect the Health of Workers in Gold Mines on the Witwatersrand.**]—*Jl. Chem. Met. & Min. Soc. of S. Africa.* 1924. Sept. Vol. 25. pp. 54–96. [Summarized in *Jl. Indust. Hyg.* 1925. May. Vol. 7. No. 5. pp. 83–84.]

The author, who is a mining engineer, advocates extended use of a direct vision konimeter by the use of which the amount of dust in the air can be immediately demonstrated. Dust generated in different processes varies so widely that conditions under which an operation is performed are more important than the operation. The only method of precipitating dust after it has gained access to the air is by condensation of water, but this has the disadvantage that it introduces a high degree of humidity in mine workings which are already hot.

Ventilation must be regarded as the chief means of combating the dust evil by sweeping the dust out of the workings. To meet this adequately, a standard suggested is 200 cubic feet of air per drilling machine, exclusive of the compressed air used by the machine. The keeping of live animals underground under varying conditions is advocated, to act as a check on the mechanical tests used.

REPORTS AND VITAL STATISTICS.

MINISTRY OF HEALTH. **On the State of the Public Health. Annual Report of the Chief Medical Officer of the Ministry of Health for the Year 1924.** [NEWMAN (George).] 266 pp. With 3 charts. 1925. London: H.M. Stationery Office. [Price, 3s. 6d. net.]

In this Report the portions more particularly of interest from the tropical aspect are to be found in Chapter III, "Infectious Diseases of Exotic Origin," ; Chapter X, "Local Sanitation and Environmental Hygiene, including Port Sanitation"; and Chapter XI, "Medical Intelligence, Investigation, and International Health.

As regards Chapter III, the following may be noted :—

Plague. In Europe the chief outbreaks during the year were in Greece and in the Ural Provinces of Russia, but there were small groups of cases also in Italy at Naples and Symi Island [off Asia Minor], in France in the suburbs of Paris, in Turkey at Constantinople, and in Crete at the port of Canea. There was a recrudescence in Nigeria, the Azores and the Canary Islands.

In the world generally there is at present no sign that the present pandemic, which began in China in 1894, is on the wane. British India continues to be the most extensive reservoir of the disease; 236,518 deaths were recorded in 1924, and the total mortality officially recorded since 1898 now exceeds eleven millions. In Russia, South Africa and North and South America endemic foci of the disease are increasing as the result of the spread of infection from local rats to wild rodents. Eradication of infection from wild rodents is an exceedingly difficult matter, for in South Africa the development of farming has been accompanied by destruction of jackals, wild cats and snakes, which are the natural enemies of the wild rodents; these have accordingly become exceedingly numerous.

Cholera. With the exception of British India the world generally was remarkably free from the disease. So far as can be ascertained no occurrence of cholera on board ship was reported in any part of the world during 1924.

Yellow Fever. In the Western Hemisphere the outbreak of greatest magnitude occurred in San Salvador, where there were 63 cases notified between June 10th and November 11th. Though still persisting in Mexico, Honduras, Nicaragua, Colombia and Brazil, the number of cases reported was very small. In the Eastern Hemisphere five cases were reported from French West Africa, eight from the Gold Coast, and two from Nigeria, but the problem still remains to be solved whether the disease diagnosed as yellow fever on the West Coast is the same disease as is diagnosed yellow fever in Central and South America.

Smallpox. During recent years it has been difficult or impossible to estimate the significance of the smallpox statistics received from abroad, for, while some countries follow the English practice of including "mild smallpox" in their notifications, others limit notification to cases diagnosed "variola vera." So far as can be judged, during 1924 severe smallpox was not very prevalent in the world generally. In Europe, except in Spain, where 566 deaths occurred in the first nine months of the year, the incidence of the disease was

relatively low. In Asia the chief epidemics were in China, at Hong Kong, Canton, and Hainan Island, and in the Dutch East Indies at Padang and Sourabaya. Except in Algeria and Egypt, Africa generally showed a decreased incidence. In Canada there was a sharp outbreak of 60 cases with 20 deaths, at Windsor, during February.

Typhus Fever. Eight cases were notified during the year, all in the County Borough of St. Helens. In the world generally, and in Europe particularly, the disease was much less prevalent during 1924 than in any year since the war.

Malaria. Four new indigenous cases of malaria were notified in England and Wales during 1924 as compared with three in 1923. One of the cases was that of a baby whose mother contracted malaria in Italy and suffered a relapse about the time of the birth of the child. It was considered by the attending practitioner that the baby may have acquired the infection directly from the mother without the intervention of mosquitoes.

Leprosy. During 1924 three cases of the disease, all originating abroad, came to official notice in England and Wales.

Dysentery. Only 15 cases of bacillary dysentery were notified during the year. The progressive decline, since the war, of dysentery as a whole is shown in the table below : –

1919.	1920.	1921.	1922.	1923.	1924.
1,657 ...	1,253 ...	1,223 ...	789 ...	484 ...	388

Trench Fever. The gradual disappearance of this post-war disease is shown by the following figures : 99 cases in 1919, 39 in 1920, 15 in 1921, 6 in 1922, 3 in 1923, and 3 in 1924.

In Chapter X the main interest from the tropical point of view centres round port sanitary control. The aims and objects of port sanitary administration are detailed.

Eight cases of ship-borne smallpox were intercepted at the following ports : Plymouth (3), Bristol (1), Liverpool (1), Hull (1), Southampton (1), and Swansea (1). In none of these port sanitary districts did any spread of the disease result from their invasion by smallpox. Two vessels arrived at the Port of London having had an unusually large number of cases of malaria during the voyage from Bombay ; on the s.s. " Macedonia " 40 cases, and on the s.s. " China " 46 cases were under treatment during the passage.

In seven of the principal ports 868 vessels reported the presence of infectious disease on board either on arrival or during the voyage. The list of diseases thus reported included cholera, plague, smallpox, malaria, sprue, tropical abscess, beriberi, enteric fever, diphtheria, scarlet fever, tuberculosis, venereal disease, etc. There is no evidence to show that any infectious disease obtained a foothold in this country through the ports.

More than 60,000 inspections of vessels of all nationalities for general sanitary purposes were made in these seven ports alone, and defects were found in approximately 12 per cent. of cases.

In these seven ports over 90,000 rats were destroyed by official agencies, in addition to a very large number by private agencies. Further, at these seven ports, 15,000 of the rodents were examined for the presence of plague ; this was not found in any instance.

As regards the medical inspection of aliens, a few cases of infectious disease (including enteric fever, scarlet fever, mumps and measles)

were discovered. These aliens were permitted to land on condition that they entered an isolation hospital and remained there until free from infection.

Amongst the subjects dealt with in Chapter XI is international health work. Reference is made to the activities of the Office International d'Hygiene Publique and of the Health Organization of the League of Nations, and the association of members of the Ministry with these bodies is mentioned.

League of Nations. **Health Organisation. Epidemiological Intelligence No. 9 : Statistics of Notifiable Diseases for the Year 1924.**—151 pp. With 8 maps & 10 charts. Geneva. June. 1925. [Price 3s. 6d.]

The statistics cover those for 29 European countries, 17 African countries, 20 American countries, 16 Asiatic countries, and for Australia.

Pages 3–85 contain notes on the prevalence of Notifiable Diseases in 1924, illustrated by maps in the more important cases. The remainder deals with the statistics, as shown by tables, of the notifiable diseases for the countries above detailed.

The work is a valuable encyclopaedia of the subject with which it deals and an accurate reference volume for those concerned in matters of public health.

Winslow (C. E. A.) & Koh (Z. W.). **The Mortality of the Chinese in the United States, Hawaii, and the Philippines.** —*China Med. Jl.* 1924. Nov. Vol. 38. No. 11. pp. 877–899. With 11 figs.

The crude death rate of the Chinese in the U.S.A. is very high (27·1 per 1,000 for California, Oregon and Washington in 1919–20, against 12·4 for the total population of those States). This is largely explained by the abnormal age distribution of the Chinese in the U.S.A. Standardization, on the basis of the standard million of England and Wales in 1901, reduced the Chinese death rate to 20, and that for the total population of the three States to 11·4.

The crude mortality for the Chinese in Manila City is much lower than in the U.S.A., and in Hawaii is lower still, being in both places intermediate between that for the local Caucasians and the native races.

In all three regions analysis consistently reveals an—apparently characteristic—excessive mortality among Chinese from tuberculosis, from diseases of the circulation, and from urino-genital diseases, as compared with Caucasians. An excessive mortality from acute respiratory diseases and from external diseases which is apparent among Chinese in the American coast States is not observed in Hawaii and Manila.

A. A.

Mededeelingen van den Burgerlijken Geneeskundigen Dienst in Nederlandsch-Indië. 1924. Pt. 5. pp. 363–460. With 1 folding chart.—**Yearly Report of the Civil Medical Service in the Dutch East Indies for the Year 1922.**

The strength of the Service during the year was 140 Government Medical Officers, including those in Mental Hospitals, Department for the Prevention of Plague and Administrative Departments.

In the school year 1921–22, 9 Indians qualified as medical men and 7 Indian officers entered government service, making a total of 190 Indian and Javanese medical officers engaged.

As regards diseases: Influenza appears now to have exhausted itself; malaria figures increased in Mid-Java and East Java; in the Wonosobo division plague was prevalent; and dysentery, and to a less extent smallpox, were present in the divisions of Lampongs, Palemgang and Benkoelen. Tuberculosis is noted as having given rise to increase as a cause of leave, particularly in the case of the native officials.

Mention is made of the activities of the hygiene and chemistry departments and of the research work done, and details are supplied of the Government Small-pox and Pasteur Institutes.

No important alterations were made in the quarantine and epidemic Ordinances. A new Ordinance for pilgrims was established, in which, among other matters, a better arragnement was reached for the protection of the pilgrims and in general of all interests concerned with the pilgrim traffic, on medical and sanitary grounds.

Information is given as to the school for the education of Indian doctors at Weltevreden, and at Soerabaja, and reports are included of the Hospital Department, Central Civil Hospitals, and the Department of Lunacy.

New South Wales. **Legislative Assembly. Report of the Director-General of Public Health for the Year 1923.** [Armstrong (W. G.).] —pp. v+157. With 23 charts. 1924. Sydney: Alfred James Kent, Govt. Printer. [Price 7s. 3d.]

Amongst the numerous matters dealt with may be noted the first report on industrial hygiene, which consists of an investigation into the health and factory conditions of certain textile workers.

The textile mills were placed in two classes :—

Class 1. Mills not engaged in the manufacture of " tops " by the dry process.

Class 2. Mills engaged in the manufacture of " tops " by the dry process requiring a high relative humidity of from 50 to 70 per cent. and a fairly quiet atmosphere.

The general conclusions are as follows :—

Mills Class 1.

Female Employees. That the health of the female workers examined shows little deterioration that can be explained by the nature of their work. That seats with backs should be provided for all female workers.

Male Employees. That while the health of the male employees showed considerable divergence from the normal, and from what is thought to be the health of the male labouring community, the divergence cannot be shown to result from the nature of their work, except in certain minor affections.

General. That more satisfactory ventilation is required in the spinning and weaving sections.

Mills Class 2.

That the health of the female workers is affected by the conditions under which they work.

That the regulation of the temperature, humidity, and air movement in these mills is unsatisfactory and requires considerable improvement. Mills Classes 1 and 2.

That in the process of mixing wool or breaking up mill wastes or woollen or cotton materials either the product blown from the machines should be received in an enclosed space or an amount of oil sufficient to prevent dust should be added to the material treated. The amount of oil necessary might be the subject of a regulation. Mill hands should not work among the material blown from the machines until it has settled.

That machines called " Shakers " should be enclosed.

That the product of the deburring machine should be received in an enclosed space and not handled until it has settled.

That napping machines in which the material is treated dry should be enclosed.

That the machines called " Cutters " should be cleaned at least twice a day, or exhaust machinery fitted.

Sanitation.

All pan-closets should be made fly-proof.

Section IV contains the report of the Microbiological Laboratory. Amongst the items of interest may be mentioned :—

In the routine examination of rodents during 1923 no infected animals were found, although one case of human plague occurred in June. The number of rats caught and examined has decreased with the freedom of the city from plague ; in 1920, 6,667 were examined ; 1921, 16,633 ; 1922, 30,038 ; 1923, 19,176. The fleas collected were *Xenopsylla cheopis* (895) ; *Ctenopsylla musculi* (672) ; *Ceratophyllus fasciatus* (376) ; and *Ctenocephalus felis* (or *canis*) (11).

Three additional cases of anthrax from the use of shaving brushes occurred during 1923, bringing the total number to 28 cases. In 1920 14 cases were recorded and 11 more in 1922.

The Schick Reaction carried out in country schools as a mode of procedure for limiting the incidence of diphtheria gave the following results :—

	Percentage of positive reactions.
Forbes State School	19·39
Forbes Convent School	23·25
Bedgerebong State School	24·1
Parkes State School	35·36
Parkes Convent School	12·5

A valuable contribution on the Australian ticks is included, keys for the identification of Australian species are given and many details as to the life-history and distribution of the different varieties in the country are provided. A list of the Australian ticks, their hosts and localization, and a useful bibliography on the subject is appended.

SHANGHAI. **Municipal Council. Public Health Department. Report of Commissioner of Public Health. 1924.** [DAVIS (C. Noel.).]—56 pp. With 3 charts. 1925. Shanghai : Kelly and Walsh, Ltd.

The report contains the usual statistical tables and details affecting health.

As regards plague, the bubonic variety was reported in no fewer than 5 maritime countries having direct communication with Shanghai

during 1924. After three years of freedom from the disease, infection among both human beings and rats was discovered.

From November 9th to November 30th four human cases of bubonic plague and two plague-infected rats were found in the Central District and one plague-infected rat in the Eastern District. The usual experience in Shanghai, as elsewhere, is that an outbreak of human plague is preceded by an outbreak of rat-plague, and is often heralded by an unusual mortality amongst rats. But this is not always so, for sometimes human beings are attacked before the disease has made any visible strides among rats.

On the occurrence of the first human cases it was thought that, in the absence of plague-infected rats, possibly a plague-infected flea had been brought down in merchandise from Kiangsi and had transmitted the disease to man. The presence subsequently of plague infected rats makes it more probable, however, that the rat had the disease in the first place, as is usual.

The origin of the infected rodents is questionable; they may have been imported with merchandise or have escaped from a plague-infected region, or again, the disease in a mild form may be always present among the rats in Shanghai. This would not be detected till the disease became more prevalent and deaths occurred among the rats, for, in the absence of plague, trapped rats are not examined in the laboratory. In the Central District generally there is old and dilapidated property which is not rat-proof, and which is heavily infested with the rodents.

A flea census was taken of rats caught alive in the epidemic foci, which gave the following results :—

Ctenopsylla	...	...	49
Ceratophyllus	...	...	20
Xenopsylla	...	...	14

A census of rats of the first 1,000 taken resulted in 701 *Rattus rattus* to 229 *Rattus norvegicus*, the former being 70 per cent. of the total.

In a publicity campaign the cinematograph film has many and valuable uses, and this means is made use of in Shanghai. Among other matters dealt with by means of films the following are noted: "Natural Ice" shows the filthy surroundings on the borders of the Settlement amid which native ice is produced. Such polluted sources of supply must lead to serious intestinal disease. "Mosquito Extermination" illustrates the life-history of the mosquito, the methods by which breeding may be prevented, and an anti-mosquito brigade at work. The destruction of larvae by means of the small Paradise fish (*Polyacanthus opercularis*) and *Gambusia affinis* is also shown. There is a "Water Melon" film showing the dangers associated with this very popular refreshment, and "Our Drinking Water" demonstrates the importance of the domestic filter and the proper methods of cleansing. Managers of local cinema halls kindly permit the showing of the films on their screens.

King Institute of Preventive Medicine, Guindy. **Report for the Year 1923-24.** [Cunningham (J.).]—29 pp. With 3 charts. 1925. Madras: Govt. Press.

A brief summary of the progress of the Institute during the past five years is as follows :—

In spite of the necessary retrenchment and want of funds the King Institute has expanded beyond all recognition.

The vaccine lymph and the microbiological sections remain, but the old serum section has been merged in the microbiological section, and a new section, the Public Health Section, has been created.

The expansion of the work has called for a complete reorganization of the scientific staff. The Institute now employs 165 men, as compared with 117 in 1919. Extensions in buildings involves the purchase of extra land for grazing and for proper quarantine arrangements for calves, a new operating theatre for the vaccine section, with the necessary adjuncts and sheds for finished calves. The alterations in the main building of the Institute will increase the laboratory space from the present 7 to 14 laboratories. Additional storerooms and offices and houses for the whole staff with the necessary additions for lighting and sewerage are also contemplated.

The problem of the manufacture of a potent lymph, which was so serious in 1919 as to make the Government consider the possibility of having to erect a new Institute, has now been definitely and satisfactorily solved. In the microbiological section, large scale manufacture of bacterial vaccines on approved lines has been introduced, and the staff is now so organized and trained that an almost indefinite expansion can take place should another emergency such as the epidemic of influenza arise.

By the institution of permanent mobile investigation units, the Institute has led the way in India in extending scientific investigation and advice to the districts. The demand for the services of these units has always exceeded the supply, and they have been instrumental in saving many serious situations where epidemic disease threatened to get, or actually was, out of control.

The value of the Institute from the financial point of view has been conclusively demonstrated, and the Government now recognize that the Institute not only pays its way but brings in a substantial profit in addition.

CEYLON. **Report of the Principal Civil Medical Officer and Inspector-General of Hospitals for the Year 1923.** [RUTHERFORD (G. J.).] 40 pp. With 1 map.

A summary of the Ankylostomiasis Campaigns for 1923 is given; in addition to the representatives of the International Health Board five medical officers of the local staff were specially employed and a varying personnel of subordinate assistants. The extent of the operations was as follows:—

(1) Intensive village treatment campaigns were confined solely to the Western Province, being located in areas selected and sanitated by the Sanitary Commissioner six months previous to the commencement of treatment measures.

(2) The hospital-dispensary units visited all Government medical centres in Eastern and Central Provinces, and completed the visits in Northern and Uva Provinces. In addition, a number of major dispensaries in Western, North-Western, Northern and Southern Provinces received special assistance during the latter part of the year.

(3) A demonstration of the feasibility and the value of control of ankylostomiasis on estates was carried out in the North Matale group.

Dysentery was unusually prevalent during 1923, 1,649 cases having been reported as against 748 in the previous year. The disease was particularly in evidence in the Western and Southern Provinces.

In one of the smaller outbreaks the faulty method of disposal of infected stools and the prevalence of flies was considered to be the cause, but in other areas where the disease assumed epidemic proportions the incidence is attributed to heavy rains and repeated floods which polluted sources of drinking water.

Enteric fever was also more prevalent than usual, and the same causes are considered to have been operative.

Other communicable diseases call for no special notice.

As in other countries "Curdled" or "Soured" milk is used by a large number of inhabitants in Ceylon. The usual method of preparation is to add a small portion of curd obtained from the local dairyman to a quantity of cool but previously boiled milk. The preparation is then left undisturbed for 18 to 24 hours at the end of which the milk is curdled and ready for consumption. A small portion of the freshly prepared curd is retained to start the batch of "soured" milk for the following day.

Eleven samples of curd procured from different sources were examined and were found to vary very considerably both as regards their physical properties and bacterial content. Four of the samples developed a foul odour characteristic of putrefaction within a few hours; they contained from 3,870 to 3,560,000 micro-organisms per cc. Streptococci were recovered from five of the samples and the faecal group of organism was present in many of the samples examined. A bacillus of the proteus group was present in two cases, *B. mesentericus* (*fuscus* or *vulgatus*) in three samples and *B. pyocyaneus*, an occasional cause of choleraic dysentery in Ceylon, in one. Nine samples contained a saccharomyces. Only 3 out of the 11 samples examined could be considered as of good quality from a bacteriological point of view, 5 were not fit for human consumption, and the remaining 3 were not above suspicion. Judging from the samples examined, it is possible that the indiscriminate use of these so-called soured milks may be the cause of obscure intestinal trouble in infants and adults in Ceylon.

KHARTOUM, KHARTOUM-NORTH & OMDURMAN. **Report on the Health and Sanitation, for the Twelve Months ending September 30th, 1924.** [BOUSFIELD (L.), M.O.H., Khartoum, & Chief San. Officer Sudan Govt.]—27 pp. With 1 chart.

Amongst the matters brought to notice is the question of the conservancy system. The double bucket system with lids is still in existence, and has now reached such a size as to be too big to be managed efficiently with the type of labour obtainable. Further, the whole system depends on a large supply of manual labour, and there is no "sweeper" class in the Sudan.

Expert advice is essential before any water-carriage system of sewerage is introduced, as the difficulties to be overcome are considerable. The country is very flat, and will not permit of a fall by gravity, the levels of the high and low Nile vary enormously, and with a really high Nile much of Khartoum would be under water were not steps taken to keep the river out.

During the year 161 new latrines were built, and between 10,000 and 11,000 buckets have to be handled daily in the three towns. The sewage pit areas continue to be satisfactory, and the sale of the soil for agricultural purposes continues popular.

Seven cases of tetanus were notified during the year, four being due to septic wounds and three, so far as could be ascertained, to intramuscular injections of quinine for malaria. The usual antiseptic precautions were taken in giving the injections, each of which were administered by a different person. Examination of the quinine material used for inoculation was negative for the presence of the tetanus bacillus.

A statement is given showing the changes in the general condition and sanitary state of the three towns during the period 1913–1924.

KENYA, **Colony and Protectorate of: Annual Medical Report for the Year ending 31st December, 1923** [GILKS (J. L.) P.M.O.] **including the Annual Report of the Bacteriological Laboratory for the Year 1923** [KAUNTZE (W. H.), Senior Bacteriologist.]—pp. iii+126. Nairobi: The Swift Press, Ltd.

Section III deals with the major endemic and epidemic diseases. The experience of 1923 does not show that Yaws is present to any great extent in districts other than those set forth in the previous annual report. The number of cases treated, 64,344, was largely in excess of that treated in the previous year. There has been no reason to modify the good opinion already expressed with regard to the efficacy of bismutho-tartrate of sodium and potassium; medical officers without exception have expressed themselves as satisfied with the results obtained. The most common toxic effect noted was stomatitis, but since the standard dose for adults of 3 grains (0·2 gramme) was universally adopted these effects have not been unduly prominent.

A very considerable increase in Syphilis was noted; this may be accounted for partly by the increased travelling by medical officers in the Native Reserves and to an increasing faith in the treatment afforded. Novarsenobillon is used only for cases presenting special features, the standard treatment consisting of intramuscular injections of bismutho-tartrate of sodium and potassium.

A large increase of the number of cases of Leprosy applying for treatment occurred, but there is no reason to believe that there has been any increase in the incidence of the disease, the correct explanation being that a more accurate knowledge is being obtained as to the conditions that exist in the Reserves.

It is believed that Tuberculosis is common even in the Native Reserves, but most of the cases escape notification. With further opportunity for more thorough clinical and bacteriological examination it is feared that the disease will be found to be common and widespread. Pulmonary tuberculosis in the native appears to be very rapidly fatal; cases of surgical tuberculosis are by no means uncommon.

Plague was prevalent in various localities and was noted in Nyanza, Ukamba, Kikuyu, Naivasha and Seyidie Provinces. In some places it assumed epidemic proportions. As regards rats, it is mentioned that the northern limit of the distribution of *Rattus rattus kijabius* as demarcated in 1921 by the late Mr. N. VAN SOMEREN has now undergone extension. In contrast to South Africa, it is interesting to note that plague, so far as is known, occurs in Kenya only in those areas where, generally speaking, the conditions of soil and climate are unsuitable to gerbilles and that with one exception the areas from

which gerbilles have been reported are free from plague. Research is urgently required, for the number of undetermined factors in Kenya is too great to allow of effective preventive work.

With the exception of a few cases, Small-pox was absent. 56,345 vaccinations were performed ; the lymph produced in the Laboratory at Nairobi proved, as usual, to be exceedingly satisfactory.

Pneumonia must be considered one of the most important factors in the death rate of Kenya. In Nairobi, out of a total of 405 deaths 163 were due to this disease. It is pointed out that pneumonia among the well-fed and well-clothed askari of the King's African Rifles is a much less fatal disease than in the frequently underfed natives from the Reserve or town.

Thirteen cases of Undulant Fever were reported during the year.

The incidence of Malaria was about the normal, 18,330 cases with 37 deaths being recorded. Blackwater Fever shows a total of 27 cases with 6 deaths.

The hospital returns show a large increase in the number of cases of Trypanosomiasis under treatment during the year ; there is no suspicion, however, that the incidence of the disease has increased to any extent. A special investigation in the sleeping sickness area of Central and South Kavirondo was carried out by Dr. Lyndhurst Duke an account of which is given in Appendix " C."

Relapsing Fever gave rise to 65 cases, a slight increase over the previous year.

Nothing has come to light to modify the conclusion that the great majority of the native population suffers from one or more helminthic infections, and though usually no symptoms are produced, it is probable that a loss of resistance to other and especially intestinal diseases is the result.

The annual report of the Bacteriological laboratory is printed in the main Report, and contains an account of the reorganization of the laboratory services, details of routine work, and the report of the research division. In Appendix II is detailed the schedule of subjects required of African laboratory assistants in training and the scales of pay for the various grades.

Tanganyika Territory. **Annual Medical Report for the Year ending Dec. 31st, 1923.** [Davey (J. B.), P.M.O.]—207 pp. With 3 charts & 1 map.

On the subject of General Diseases : Anaemia, from whatsoever cause arising (ankylostomiasis, schistosomiasis or trypanosomiasis), is of common occurrence among the natives. Arthritis is frequently observed, but in many cases its nature is obscure. Pyorrhoea and other sources of septic infection are very common. Food deficiency diseases do not figure prominently in the returns. Gross organic lesions of the nervous system are seldom reported among natives but epilepsy is common and frequently severe. Diseases of the eye, principally conjunctivitis, are common, and cases of blindness, due commonly to small-pox, cataract, or injury, are numerous. Diseases of the ear are very common and discharging ear cases in native children are a troublesome problem in dispensary practice. Pneumonia causes a heavy mortality among natives, and bronchitis, not usually of severe degree, is very common. Diseases of the digestive organs are frequent, and the suspicion that, of the numerous cases of stomatitis in natives,

many are mild forms of scurvy can hardly be rejected; dental caries is far more common among natives than is usually believed. Abscess is extremely common and the aetiology of many of the large abscesses is often obscure; some no doubt are tubercular, possibly some are filarial. Diseases of the skin are almost universal, scabies frequently masked by severe impetigo is exceedingly common, and ulcers are a great cause of disablement. The tumours met with are commonly fibromata or lipomata, and are often of enormous size before skilled attention is sought.

Of the helminthic diseases, it is probable that schistosomiasis is widespread in the Territory, though it has been reported from only a few stations; taenia is a very common parasite due, in the large majority of cases, to the consumption of measly beef; ankylostomiasis is common in the coastal area, particularly in the neighbourhood of Tanga; filariasis is widely distributed; ascariasis is very prevalent; no case of guinea worm has been reported during the past three years; *trichocephalus dispar* is common. Cutaneous myiasis is not uncommon in Europeans, and though cases are not often seen in natives they must, no doubt, often occur. Chiggers are widely distributed. Cerebro-spinal meningitis was prevalent since the first week of the year in Mwanza district, whence 90 out of the 101 cases were reported. Nine cases of dengue were reported from Dar-es-Salaam. Dysentery, usually of a mild type, is distributed throughout the Territory; the enteric fevers occur sporadically; "Seven-day Fever" of non-malarial origin, in limited amount, and of negative blood culture, was reported from Dar-es-Salaam. Leishmaniasis does not exist, so far as is known, in the Territory, but the occurrence of undoubted cases of kala azar in Kenya demands watchfulness.

Malaria is general throughout the Territory; even the healthiest stations have malarious country round them, and infection is easily acquired when on tour; 19 Europeans and 16 non-Europeans were treated for blackwater fever during the year, but no cases were recorded amongst natives. Plague occurred in the endemic areas of Singida and Shirati, a total of 39 cases with 26 deaths being reported during the year. Relapsing fever gave rise to 119 notifications; *Ornithodorus moubata* is widely distributed, and during the war established itself in several European residences; the danger of acquiring infection appears to vary greatly in different districts. Smallpox diminished continuously throughout the Territory during the year; nearly half the cases occurred in the Tanga district. Trypanosomiasis undoubtedly occurs in parts of the Territory other than the Mwanza district, and it was intended to investigate the question as soon as staff was available. The observations made in 1923 confirm the opinion expressed in the Annual Report of 1922 that the vector is *G. swynnertoni*, and the causal trypanosome *T. rhodesiense*. Yaws is probably the most important cause of disability and ill-health amongst the natives; in some districts it is described as being practically universal.

The Report contains detailed accounts of certain of the diseases above mentioned. In the annual report of the medical officer of the Anglo-Belgian Boundary Commission interesting information is supplied on many matters, including the general physique and some customs and habits of the natives in the districts which were traversed, and a section dealing with the entomology of the area.

In Section VI, Scientific, is to be found the third report upon treatment with bismuth sodium and potassium tartrate, which preparation

has a very decided curative effect on cases of yaws and primary and secondary syphilis. In tick fever the few results reported were disappointing.

The report of the Dar-es-Salaam laboratory is also included, and contains much interesting matter.

The usual statistical tables are appended.

BALFOUR (Andrew), [C.B., C.M.G., M.D., B.Sc., F.R.C.P.E., D.P.H., Director, London School of Hygiene & Tropical Medicine.]. **Report on Medical and Sanitary Matters in Bermuda, 1923.**—91 pp. With 1 chart, 1 folding map, 1 folding plan & 107 figs. on 36 plates. 1925. London: Waterlow & Sons, Ltd., London Wall.

This investigation was carried out in 1923 at the request of the Secretary of State for the Colonies. The original terms of reference were "to report and advise on the best means for the reduction of mosquitoes and to enquire into the rôle that mosquitoes may play in the propagation of disease, and more especially the febrile diseases occurring in the Colony." These terms were subsequently amended "to include the consideration of all those conditions of the public health which may detrimentally affect the tourist traffic to the Colony and its popularity as a place of resort for visitors from Europe and the United States of America."

Before leaving the Colony an interim report was submitted so that action could be taken on several matters requiring immediate attention. It dealt with the following subjects: The mosquito problem; laboratory provision; communicable diseases and their prevention; the leprosy question; King Edward VII Memorial Hospital; school hygiene; the poor houses; general sanitary condition of the Colony; co-ordination of medical and sanitary work; health administration.

The Report is an example of what may be accomplished in a strictly limited period of time, and should prove a useful guide to others called upon to conduct enquiries of a similar nature. It contains a mass of detailed information as to the local conditions, pointing out the defects noted and suggesting means by which they may be remedied. Much of the subject matter is naturally of local interest, as it is descriptive of the conditions appertaining to the island, yet it may prove of interest to those living in other islands situated in comparable position in certain respects to Bermuda, and may prompt enquiry of a local character in the problems that may exist there.

The mosquito problem, for instance, is one which is without much doubt of interest elsewhere than Bermuda. The four species of mosquito found are *Aëdes aegypti* (*A. argenteus*, *Stegomyia fasciata*), *Culex fatigans*, *Aëdes sollicitans* and *Aëdes taeniorhynchus*. The two last-named are salt-marsh breeding mosquitoes, and while not known to be carriers of any disease, may make life a burden, as they are very vicious biters. Contrary to its habits in the U.S.A., *Aëdes sollicitans* in Bermuda does not appear to range far from its breeding-places, and does not tend to enter houses. In the summer *Aëdes taeniorhynchus* disperses itself widely and frequently invades habitations.

Aëdes aegypti in Bermuda appears to be wholly a domestic breeding mosquito; no evidence could be found of its larvae in hollow trees, cavities in cut bamboos, etc., at any rate during the winter months,

at which time the investigations on which the report is based were conducted. It is, however, probable that such places are utilized in the summer season, for it was found to be breeding in rowing boats beached for the winter, water-containing barrels which had been used for mixing lime, the shallow layer of water which accumulates on the top of a barrel standing on end, and in flower receptacles in cemeteries, during the winter months.

In some respects *Culex fatigans* is the most important mosquito in Bermuda, for it is present in large numbers in the neighbourhood of houses, and is quite possibly the carrier of dengue fever, which still occurs at intervals in the Colony.

No likelihood of the total extermination of all four species of mosquito is probable, but it should not be impossible to get rid wholly of the two salt-marsh breeders, while *Aëdes aegypti* might be reduced to vanishing point. *C. fatigans* is a more difficult problem, but in a comparatively small area like Bermuda there is hope that concerted action on well-conceived lines would bring it close to extinction and keep the numbers at a low level.

In detailing the measures for combating the mosquito nuisance one most important point may here be mentioned; namely, that the services of an expert entomologist would be of the very greatest value in advising on the necessary engineering work in filling operations, etc. Such advice may well repay any cost of provision, for, unless the bionomics of the particular mosquito attacked are fully understood, much unnecessary work may be undertaken and expense incurred. This is true not only with reference to mosquitoes, but in practically every measure affecting the control of animal life with which the sanitarian has to deal.

It is not possible to give particulars of the many other matters dealt with in this report, and those interested are recommended to read it in the original.

Hill (Rolla B.). **Public Health Progress in Porto Rico.**—*Amer. Jl. Trop. Med.* 1925. May. Vol. 5. No. 3. pp. 211–217.

Public health work in Porto Rico may be said to have begun in 1918 with the initiation of a campaign against the hookworm under the leadership of the International Health Board of the Rockefeller Foundation. A survey showed that 90 per cent. of the rural population of the island were suffering from the disease. There was, however, a lack of public interest at first, but the work was again taken up in 1920 and pursued with activity.

Less than 10 per cent. of the homes visited were then found to possess latrines, but in three and a half years no less than 35,000 latrines have been built in the zones of intensive operations, and now it is a common matter to find fully 25 per cent. or more of the houses provided with them. Many thousands have also been built outside these zones of special activity.

In 1920 malaria studies were undertaken in the irrigated section of the southern part of the island, and in 1924 these were extended to the northern portion. Reliance is placed on quininization in the endemic regions, while several drainage operations have been effected and fish are coming into use to control mosquito breeding.

A special plague preventive service has been organized, and a modern plague laboratory is in existence. In 1923, 115,000 rats were destroyed. Warehouses are periodically fumigated.

There has has been an alarming increase of tuberculosis, especially in the larger cities, and in 1923 a Bureau of Tuberculosis was organized. An active campaign was at once begun; dispensaries were opened in the principal towns, visiting nurses were sent out to find and to follow up cases, and much propaganda work was undertaken.

In 1923, also, a Bureau of Venereal Diseases was formed, which by means of dispensaries, publicity and educational work, is engaging actively with the disease.

In the same year a Bureau of Child Hygiene and Social Welfare was instituted, vaccination against smallpox has been made compulsory, the Schick test has been introduced and toxin-antitoxin immunization is practised in certain places. Regular medical and dental examinations are made of all school children, both urban and rural, the parents being notified of any defects encountered.

The Department of Health employs eight full-time medical officers and a large number of inspectors. There is a main public health laboratory and a special division of sanitary engineering.

The newly-organized School of Tropical Medicine, under the auspices of the Columbia University, commenced its first session in November, 1924.

Porto Rico has made enormous forward strides and has found the resulting advantages well worth attainment.

United Fruit Company. **Medical Department. Thirteenth Annual Report.** [Deeks (William E.), General Manager.]—247 pp. With 1 map & 9 figs. Boston, Massachusetts: General Offices.

This report contains much of interest. In Section III, amongst the matters dealt with in the "Comments on some of the chief Tropical Diseases and their Treatment," the following may be noted.

The conclusions reached as regards Malaria may thus be briefly summarized:—

(1) The administration of quinine will not prevent malaria infection. In other words, quinine has no effect on the sporozooites, but becomes effective only after the malarial parasites have entered the red blood cells.

(2) The daily administration of quinine, or its interrupted administration two or three times weekly in sufficient quantities, though not preventing malaria infection, will control its development and probably cure many of the cases in from 10 to 14 days, if reinfection is prevented. As reported by some of the medical superintendents, the continuous use of quinine prophylactically is serving a very useful purpose in greatly reducing the morbidity and consequently the number of hospital admissions.

(3) Cases of malaria complicated with other conditions are more difficult to cure than uncomplicated cases.

(4) The more chronic the infection, the longer the administration of quinine must be continued in order to effect a cure.

(5) Immunity can be, and frequently is, developed, but immunity against one species of the malarial mosquito does not prevent infection by other species.

(6) Proper and sufficient nourishment plays an important rôle in the development of immunity.

(7) The therapeutic results of quinine given in liquid and solid form are the same, provided the drug in either case is swallowed, retained and absorbed. Some, however, believe that the liquid preparations act more quickly than the solid.

(8) It is important to know that all solid preparations of quinine must disintegrate rapidly, or they will pass through the alimentary tract unchanged.

(9) There is no reason why an intelligent man, with a proper knowledge of the causation and prevention of malaria, should contract the disease if he has measures available for his protection, and applies them.

The routine method of treatment in all the hospitals of the United Fruit Company has hitherto been 15 grains of quinine in solution three times daily, but during the last year alteration in this routine was instituted by Dr. MACPHAIL. He at first substituted 20 grains of liquid quinine morning and evening. The control of symptoms was affected as quickly and efficiently as in the case of those given 15 grains three times a day, the economy in the nurses' time is considerable, and the patients prefer taking the bitter mixture twice a day to taking it three times; in fact, the results obtained were satisfactory from all points of view. A further change was then tried and quinine, mostly in friable tablets, was given in the dry condition in doses of 20 grains morning and evening. The charts of 1,024 cases thus treated were analysed with a view to comparison with the older routine method of giving quinine in solution. Of these 1,024 cases only 29, that is, less than 4 per cent., showed secondary rises of temperature, or persistent temperature, demonstrating lack of control. All the series were uncomplicated malaria; 406 were aestivo-autumnal infections, 357 tertian, 5 quartan, 22 mixed infections, and 234 were clinical cases. From these findings it was concluded that, from the purely therapeutic point, the present routine of 20 grains of dry quinine twice daily compares favourably with any method previously followed. When the economy effected in the nurses' time, and the ease with which the average patient takes the drug in the dry state is considered, there is a strong argument for the use of dry quinine. The essential point of the greatest importance in obtaining satisfactory results is that the tablets administered should be really friable.

As regards blackwater fever the results obtained in treatment in the Banes, Costa Rica and Quirigua Divisions have been exceedingly satisfactory. The use of anti-streptococcic serum was tried, as also was caffeine sodio-benzoate; in both cases the beneficial action of the drugs is held to be due to the anti-haemolytic properties which they possess. It was noted, as has been done on many other occasions, that after the administration of quinine in 10 grain doses three times daily was begun there was a return of the blackwater. Following an attack of blackwater fever, after the urine is cleared and the administration of quinine is indicated, it is wise to begin with a very small dose—from 2 to 5 grains—and if within a few hours there is no recurrence of the symptoms, the dose may be gradually increased.

As regards typhoid fever there has been some doubt in the mind of certain local physicians whether these diseases existed in the Colombian Division or not. This doubt, however, has been dispelled

by the positive Widal tests, and the blood cultures made from cases coming into hospital from these regions.

As to the incidence of pneumonia among the labourers in banana plantations, Dr. WINN, of Puerto Castilla, makes the following statement :—

At least four factors have to be taken into consideration as affecting the incidence of the disease :—

(1) The first and foremost is held to be lack of personal hygiene and cleanliness. The labourers work on the banana farms, they rarely bathe and rarely change their clothes. They come in wet at night from perspiration, and lie down to sleep in the same wet clothing.

(2) Many of them suffer from debilitating diseases, like malaria, hookworm, syphilis, etc.

(3) A large number of them are alcoholics and suffer from some form of nephritis. Undoubtedly, also, the question of bad teeth, pyorrhoea, infections, etc., has some influence on the incidence of pneumonia.

(4) Undernourishment and lack of proper food doubtless play a part in lowering the vitality and therefore the resistance to disease.

WOLFF (J. W.). **Some Statistics about Surinam (Dutch Guyana).**— Reprinted from *Metron.* 1924. Dec. 1. Vol. 4. No. 2. 7 pp. With 2 text figs.

Surinam, or Dutch Guiana, covers an area four times as large as Holland. The greater part of the country is dense tropical forest, here and there intersected by large streams which form the natural means of communication through the interior. The country is extremely sparsely inhabited and great parts of the interior are still unknown. Besides the capital, Paramaribo, there are only three or four villages on the strip of country along the coast. In the interior some of the original Red Indian inhabitants are left and there are some settlements of bush negroes. Camps of creole or negro labourers engaged in gold digging, balata bleeding (a kind of indiarubber) or prospecting may be met with.

The population represents an amalgamation of many races, due to immigration of foreigners since the discovery of the fertility of the land. Prior to 1921 no accurate census was available ; the figures for that year, exclusive of Red Indians and bush negroes, made a total of 107,723 ; 56, 177 being men and 51,546 being women. East Indians and Javanese form an important part of the population, Europeans being sparsely represented.

Of diseases, malaria, especially the malignant type, is of greatest import, but typhoid fever, dysentery, filariasis, leprosy and ankylostomiasis are present.

BULLETIN OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1925. June. Vol. 17. No. 6. pp. 633–640. [4 refs.]—**Activité du gouvernement péruvien, dans le domaine sanitaire, pendant le second semestre de l'année 1922 et toute l'année 1923. (Extrait du** *Boletin de la Dirección de Salubridad Pública,* **Ministerio de Fomento de la República del Perú, Lima, 1924.)**

The more important measures include the reorganization and the extension of the sanitary services of the Republic, new regulations governing the practice of medicine, obstetrics, pharmacy and dentistry,

measures for the protection of mothers and infants, works for the improvement of conditions in town and country, campaigns against bubonic plague, tuberculosis, malaria, etc., disposition and regulations as to mortuaries and cemeteries.

Details are given of the various changes under the above headings and a list of the principal legislative measures is attached. The improvements are in accordance with the practice of modern medicine.

MISCELLANEOUS.

BALFOUR (Andrew). **The Teaching of Preventive Medicine.**—*Public Health.* 1925. Feb. Vol. 38. No. 5. pp. 135–141.

After some preliminary remarks upon the importance of that sanitary environment which the present age, in its anxiety for the hygiene of the individual, almost takes for granted, and upon the scope of that environment, and, furthermore, upon the importance of a knowledge of the history of the growth of that environment [all points of fundamental interest to the whole medical profession], the author goes on to outline and expound the provisional scheme of instruction to be followed in the Hygiene branch of the London School of Hygiene and Tropical Medicine. The scheme, which will provide for the separate requirements (*a*) of candidates for the D.P.H., and (*b*) of advanced students and others following special professional lines of study, includes six distinct fields of work, namely: (1) Applied physics, physiology, and the principles of hygiene; (2) chemistry and biochemistry; (3) immunology and bacteriology; (4) medical zoology, parasitology, and comparative pathology; (5) epidemiology and statistics; and (6) the principles and practice of preventive medicine, general sanitation, and administration. For the further subdivision of these six sections and the ordered "courses" to which they severally contribute the original article can be consulted.

A. Alcock.

BALFOUR (Andrew). **The Trend of Modern Hygiene.**—*Jl. Roy. Soc. of Arts.* 1925. May 29. Vol. 73. pp. 623–639.

The subject was dealt with in a lecture at the Royal Society of Arts. The lecturer first traced the ancient sanitary principles, leading thus to the modern ideas of hygiene. Stress was laid upon the need for education, not so particularly of the medical fraternity and its associated workers, as of the general public. Unless the "man in the street" is alive to the needs of sanitation advance is delayed, for it is public opinion which is the great driving force in health matters as in most things.

In this country the importance of veterinary science in its relation to the public health is not yet fully realized. Enlightenment on this matter is commencing and interest is being awakened. Publicity is needed and the Press can do much to help matters forward if it be rightly guided.

The penetration of health considerations into the ordinary life of the citizen is evidenced by the attention paid to the subject by

insurance companies, especially in the United States. The application of modern health principles has been found to be a sound business proposition for the insurance profession and, moreover, it is of profit to the insured person.

As regards the medical profession itself the tendency is undoubtedly towards the gradual implantation on the mind of the general practitioner of the greater value of disease prevention as compared with the cure of existing ailments. In America this "permeation of the medical curriculum with the preventive idea" is further advanced than it is with us, for in the Vanderbilt University, Nashville, Tennessee, appointment has recently been made to a chair which will be concerned with this work.

On the question of food much still remains to be done, and we are not in the fore in the world in these matters. We are beginning to realize that we are a dirty nation in many matters concerned with the handling of food.

Mention was made of the world-wide activities of the International Health Board of the Rockefeller Foundation, which has spread its campaigns all over the globe and whose operations are as diverse as they are valuable.

The question of the over population of the world following on man's interference with Nature's principle of the survival of the fittest is touched upon. We cannot pierce the future, and, anyhow, this old world of ours has a way of settling its own problems irrespective of puny man. If the work of the hygienist as applied to the saving of life is wrong in principle we may be sure that in due time the corrective will be applied. At least for the present it is our duty to carry on in the manner which we, as a result of the knowledge we have acquired, believe to be right.

LEISHMAN (William). **Health in the Tropics: the Present and the Future. Being the Linacre Lecture, 1925, St. John's College, Cambridge.**—*Jl. Roy. Army Med. Corps.* 1925. Aug. Vol. 45. No. 2. pp. 81–95.

The lecturer chose this subject for his discourse for two reasons: First, because of his strong belief in its importance, and secondly, because of the urgent need that there should be a wider appreciation of our responsibilities in this matter, both present and to come.

As examples of the above, twelve from the long list of tropical diseases were selected because: (*a*) of the degree and importance of their influence upon the health of either the white or the native population, or both; (*b*) of the stage of our knowledge as to their causation and of the means of prevention; and (*c*) of the different degree in which it has been found practicable to apply existing knowledge to their effective control.

The diseases selected for examination were ankylostomiasis, cholera, dysentery, enteric fever, filariasis, leprosy, malaria, plague, relapsing fevers, sleeping sickness, typhus fever and yellow fever. Each disease was shortly described, and its influence on the peoples of the world and its effects upon progress were mentioned. The position of our present-day knowledge as to their causation and the means we possess for prevention were shortly described.

The lecturer expressed the opinion that, on the whole, we are too much inclined to congratulate ourselves on the remarkable progress

that has been made in tropical medicine during the last 30 years, and to lay stress on what has been done rather than upon what remains to be done. Again, it is not sufficiently realized that most of us, when we speak or read of health in the tropics, think almost entirely of the white residents, and give little thought to that of the native populations.

As regards the white resident in the tropics, accurate knowledge of the causation of disease, the diffusion of that knowledge and its utilization by an efficient health service, have, in his case, made life in the tropics, at any rate in most places, almost as safe as at home.

On the other hand, what is the condition of the 300,000,000 of the native races for whom we are responsible? Their state may be gauged by anyone who is interested by reference to official reports and blue books, a perusal of which can only cause us grave heart-searching and disquietude. In short, the native, from the health point of view, is, in many countries, little, if at all, better off than he was before we accumulated the mass of knowledge from which the white has benefited and is benefiting so greatly.

Sympathy and understanding are most certainly not wanting amongst most of the responsible officials, and the whole-hearted devotion of those engaged in health work in the tropics can only call forth true admiration. Yet for progress to be made we do lack certain things, and these are three in number—men, money, and knowledge.

Lack of men. Only those familiar with the existing conditions can realize the pitiful inadequacy of the numbers engaged in the fight against disease in the tropics. What can one expect where perhaps a single white man is responsible for the health of a population of hundreds of thousands spread over an area many parts of which he can only hope to visit once or twice in the year? Where we have one man now, in many parts of our tropical possessions we ought to have ten and in some places, indeed, fifty would not be too many. This lack of men includes all personnel, from the Director of Medical Services to the trained native assistants of the sanitary inspectors. One class especially needs reinforcement, the European Sanitary Inspector, whose power for good, given the right man, is infinite. Reinforcements of personnel are inseparably connected with money.

Lack of money. This handicaps, with exceptional severity, progress in the tropics. The financial mind is most readily appealed to by a satisfactory rate of interest on the money expended, and is not so likely to respond to an account of fewer deaths of adults and an improved infantile mortality. This is, however, not always the case; here and there local governments, individual undertakings and business concerns have shown a wide and generous sympathy in the matter. In many cases this expenditure on health measures has been amply justified even from the money point of view. If those who provide the funds can be convinced, not only that the measures are necessary, but that they are thoroughly sound in principle, can be applied effectively and have been framed with due regard to economy, it is probable that steady advance in this respect is to be anticipated.

Lack of knowledge. In spite of all we have so far gained, there is need of more information on many points. One direction in which knowledge is most necessary is the economical application of preventive measures. Our present knowledge often points to measures which are altogether impracticable to a populace of a low scale as regards

civilization, or which are and must remain entirely out of the question on account of their prohibitive cost.

There is need to foster our dissatisfaction at the limitations of our knowledge, and there is a crying need for more and more research. The lines of approach are innumerable, and each disease has its own unsolved problems, many of which in the tropics are concerned with insect hosts or transmitters. One must get far closer down to the intimate life of these dangerous pests and learn ever, in more and more detail, their hopes and fears, their tastes and dislikes, their loves and hates, and so wrest from them such secrets as we may hope to utilize.

MAITRA (Jogendra Nath). **Medical Examination of the Students of the Presidency College, 1924.**—*Calcutta Med. Jl.* 1925. Apr. Vol. 20. No. 10. pp. 382–385.

Five hundred and sixty-five students of the 1st and 2nd year classes in the Intermediate Arts and Science and B.A. and B.Sc. courses were examined with the following results :—

As regards general appearance, A denotes good muscular development ; B, stoutness without muscularity ; C, medium musculature ; and D, poor bodily development.

A.	B.	C.	D.
5·84 per cent.	10·61 per cent.	64·24 per cent.	18·93 per cent.

As regards posture, the students were divided into Erect and Stooping :—

Erect.	Stooping.
63·18 per cent.	36·82 per cent.

As regards vision, the following was found :—

Normal.	Defective.
61·04 per cent.	38·96 per cent.

As regards teeth and gums :—

Teeth.	per cent.	Gums.	per cent.
Normal	75·57	Normal	73·99
Carious	8·84	Spongy	24·07
Defective	15·59	Pyorrhoea	1·94

Defective teeth was believed to be correlated with poor physical development.

Fifty-nine per cent. were found to be defective owing to affections of heart, throat, lungs, spleen, eyes, liver, etc.

FREDERICK (Robert C.). **The Investigation of Ventilation Conditions.**—Reprinted from *The Analyst.* 1925. May. pp. 213–223. [29 refs.]

The harmful effects of living in air vitiated by the products of respiration were formerly considered to be due to the poisonous action of the added carbon dioxide, the deficiency of oxygen, and the presence of an unidentified poison.

DE CHAUMONT, in 1875, stated that when the normal amount of carbon dioxide in fresh air, which he considered to be 0·04 per cent., was increased by more than 0·02 per cent. from respiration this excess was perceptible to the senses by an associated disagreeable smell. It is remarkable how this statement received, and still receives, such general acceptance. The error was perpetuated in the fixation of the so-called sanitary limit for carbon dioxide, 0·04 + 0·02, a total of 0·06

per cent., which to this day appears to be regarded as standard by many analysts and sanitarians. The question of the effect of carbon dioxide may be disposed of, for a concentration of 0·5 per cent. leads to no noticeable increase in the ventilation of the lungs; a concentration of 2·0 per cent. simply results in a 50 per cent. increase in the depth of breathing such as occurs with moderate exercise, and living in such a concentration does not cause discomfort unless vigorous exercise is performed. It is not until the amount increases to between 5 and 7 per cent. that breathing becomes laboured when the subject is at rest.

The claim that deficiency of oxygen was responsible is also incorrect, for Leonard Hill has shown that a person not exerting himself will fail to notice any effect until the oxygen has been reduced to about 11 per cent., and consciousness will not be lost until the percentage sinks as low as below 7 per cent.

The belief in the existence of a poison in exhaled air was founded on experiments in which the condensed water vapour from human expirations was injected into animals with fatal results. The question has since been the subject of much research, and the net result goes to show that there is no evidence that such a poison exists.

Hermans was the first to state definitely that the most important considerations in ventilation are not carbon dioxide, or oxygen, or personal effluvia, but temperature and humidity. His teaching fell, for the most part, on deaf ears, and it was not until 1905 that his theories obtained general acceptance.

The importance of temperature and humidity is due to their influence on the body metabolism. The body is continually forming heat, and to maintain a proper balance there must be a continuous process of heat loss of adequate compensatory degree. When temperature and humidity are high, heat loss is retarded, and discomfort is experienced; in extreme cases heat-stroke and death may supervene. The essential requirement of ventilation is, therefore, that conditions shall be maintained such as to permit free loss of heat from the individual.

The heat-regulating mechanism is greatly assisted by any means which disperse the envelope of hot humid air surrounding the subject between the skin and the clothes. Movement of air in a space by direct transfer and promotion of evaporation is the most potent factor in rendering this assistance, and its importance in ventilation cannot be over emphasized.

In investigating ventilation conditions it is necessary to make the following examinations of the air: (1) Determination of carbon dioxide; (2) determination of temperature and humidity; and (3) determination of cooling power. Of these, the first is the most important, for, if the figure is low, it is probable, speaking generally, that the remaining determinations will also give satisfactory results.

The methods recommended are: For determination of carbon dioxide, the Haldane Apparatus; for determination of temperature and humidity, a wet and dry bulb hygrometer of the Mason type; for determination of the cooling power, the Kata-thermometer, the dry instrument giving the cooling power by radiation and convection, and the wet that by radiation, convection and evaporation, and in consequence the difference between the two is the cooling power by evaporation. Details of the working of the apparatus mentioned are supplied. Air movement can be most conveniently studied by observing the behaviour of a column of smoke.

Health. **Skin Eruption due to Mites in Upholstery Work.**—1925. May. Vol. 3. No. 3. p. 86.

At a motor works in Brisbane a number of workmen developed skin eruptions, which were thought to be associated with the presence in the upholstery of the cars of a large number of mites. The cars had very recently been imported from Italy.

The eruption somewhat resembled that of scabies, and was not attended by any constitutional disturbance or by any absence from duty. It had thus none of the characteristics of the typhus-like disease described by Hone in Adelaide.

Specimens of the mites were examined, and the majority were found to be *Tyroglyphus* species. It is probable that the upholstery had become infested either in Italy or during passage in a mite-infested ship, the cars having only very recently arrived in Australia.

Instances have been previously reported in Australia by Cleland and others of skin eruption due to the bites of mites.

Campbell (E. A. Glen). **The Housing Problem of the Poor and Labouring Classes and the Slums of Kingston Jamaica. Conditions existing locally, of which Majority of Citizens not aware. An Address delivered before the Liberal Association January 11th, 1919.**—19 pp. Kingston: Gleaner Co., Ltd.

The author of the address is the Chief Sanitary Inspector of the Colony, whose work takes him into places not usually entered by the ordinary citizen. According to the account housing conditions in certain parts of the town are in a deplorable state of overcrowding and general insanitation. The position of the Municipality in reference to the existing state of affairs is discussed, as also is that of private enterprise, and the local condition is contrasted with other and more fortunate places. Suggestions are put forward whereby the present conditions may be remedied; these, as may be expected, involve considerable expenditure of money.

Addresses such as this are of value in that they ventilate a wrong, invite discussion, criticism and possibly opposition, and yet may awaken a sanitary conscience where it is apparently dormant.

Stewart (A. D.) & Banerjee (Nani Lal). **On the Commercial Preparation of a Neutral Soft Soap.** *Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 783–787.

Soft soap has a variety of uses for medicinal and for textile purposes, and in both cases the presence of free alkali in it is objectionable, and unsaponified fat, oil or fatty acid is detrimental to the lathering power of the soap.

Olive, linseed or cotton-seed oils are all expensive, but the investigators found that fish oil is cheap in comparison, and is suitable for use. The only objection to this oil is its smell, but this can be largely eliminated by the suggested method of saponification, and any trace left can be totally masked by the addition of a small quantity of a cheap scent such as lemon-grass oil.

It was found that a reversal of the ordinary process of adding the lye to the hot oil was advantageous and soap thus prepared is much

more free from fishy odour than that prepared by adding the alkali to the oil. The odour can be further diminished by diluting the soap with water, prolonged boiling, and blowing air through the hot mass. NH_4Cl was found most suitable for neutralization, and the process needs to be carried to excess of the theoretical amount.

The conclusion is that a cheap and practically inodorous soft soap can be manufactured from fish oil by running the oil into an excess of hot KOH lye gradually and diluting, boiling the mixture and subsequently blowing air through it. The excess of alkali in the soap can be easily neutralized by adding a solution of NH_4Cl to 28 per cent. in excess of the theoretical amount required. Ammonium chloride has a three-fold advantage : (1) It offers a rapid method of estimating free alkali in the soap ; (2) it can be recovered and used over and over again ; (3) a portion of it can be left in the soap with advantage.

League of Nations : **Health Section, Eastern Bureau. The AA Cable Code. Compiled for the Bureau by Gilbert E. Brooke, Director.**—45 pp. With 1 plate & 1 folding map. 1925. Singapore : C. A. Ribeiro & Co., Ltd.

The Code will secure ease of communication for the specific purposes of the Bureau and a maximum condensation of material in a minimum of code letters has been aimed at. The Code is simple to use, and the directions given are clear and concise, while the scope should prove sufficient to meet all requirements. An Auxiliary Code (the EE) covering a much wider range of public health activities is in course of preparation.

Gouzien (P.). **Faits épidémiologiques en Afrique occidentale française et accords sanitaires particuliers.**—*Ann. de Med. et de Pharm. Colon.* 1925. Jan.–Feb.–Mar.–Apr. Vol. 23. No. 1. pp. 66–81.

The author gives some account of the agreements which have been concluded, both national and international, to restrict the introduction of transmissible diseases, and in allusion to the crossing of the Sahara by French motor cars expresses the fear that typhus may be imported by this new channel from North Africa into French West Africa. He gives an outline of four outbreaks of disease demonstrating the necessity of sanitary accords between the African colonies which border the Atlantic Ocean—plague in Senegal, cerebrospinal meningitis in the Niger colony, advance of relapsing fever in that colony and the reappearance of yellow fever in Dahomey—all in 1924.

Plague appeared in Senegal in 1914, where it has been endemic since with annual recurrences ; in the first months of 1924 there were notified 1,727 cases with 1,115 deaths (Cayor, Thiès, and Sine-Saloum.) In 1921, louse-transmitted relapsing fever, which has probably long existed unrecognized in French West Africa, broke into an epidemic and occasioned 50,000-60,000 deaths, chiefly in the French Soudan and Upper Volta, and later in the Niger colony. Here, as in other countries where it is endemic, the disease makes its annual reappearance in the cold weather. Yellow fever reappeared in April at Bohicon, near Abomey, and was fatal to six Europeans. Cerebro-spinal meningitis reappeared, also at the first cold weather, in the south-west of the Niger colony and caused 6,597 deaths.

These four seasonal outbreaks are then considered with a view to the lessons they teach. The freedom from plague hitherto of the French Soudan is attributed to the meteorological barrier interposed by the high temperatures reached, *e.g.*., at Kayes 43° and 44° in April and May. The excess of humidity of the soil in winter is also against the flea. In the case of relapsing fever its extension depends on whether conditions are favourable or not to the louse, *e.g.*, clothing and water supply (for washing), and it is noted that the limit of the epidemic (apart from an extension to the Gold Coast) corresponded with a sinuous line dividing clothes-wearing Mahomedans in regions ill provided with water from tribes with little or no clothing and abundant water. Just as there is for plague a meteorological barrier, so there is for relapsing fever a human barrier.

For yellow fever the Gold Coast is regarded as a focus of permanent endemicity, and the colonies of the Soudan, Ivory Coast, Dahomey and French Togo as so in lesser degree; for these the term intermittent endemicity is used.

A. G. B.

REVIEW.

LEAGUE OF NATIONS. **Health Organisation. Further Report on Tuberculosis and Sleeping-Sickness in Equatorial Africa. Submitted to the Health Committee at its Fourth Session, April, 1925.** [BALFOUR (Andrew), VAN CAMPENHOUT (E.), MARTIN (Gustave) & BAGSHAWE (A. G.).]—84 pp. With 7 maps.

The "Interim" report, of which this is a successor, was reviewed in Vol. 21 of this *Bulletin* (pp. 498–501).

TUBERCULOSIS: (*a*) *British Territories.* The present report is compiled from the latest Annual Medical and Sanitary Reports of the several colonies, where the respective numbers of cases of tuberculosis treated in 1922 were as follows: Gambia, 9; Sierra Leone, 91; Gold Coast, 385; Nigeria, 287; Nyasaland, 40; Tanganyika, 206; Zanzibar, 79; Kenya, 310; Uganda, 29; British Somaliland, 167 (and 215 in 1923). In Freetown (Sierra Leone) the pulmonary form is increasingly prevalent. In Accra (Gold Coast) a promising experiment in open air treatment has been carried on. From Northern Rhodesia there is little information, but the degree of infection is believed to be low. In the mines of Southern Rhodesia there were, in 1921, among 37,605 natives from various parts, 130 cases of phthisis, with 39 deaths. In Mombasa (Kenya) a ward for phthisis cases has been erected at the Infectious Diseases Hospital. In the Anglo-Egyptian Soudan "a certain amount of tuberculosis, both pulmonary and surgical, does exist, but the incidence cannot be said to be heavy"; the admissions for eight years (1916–1923) show, among fluctuations, a slight increase in later years, and for 1923 a percentage of 1·38 of the total admissions for all diseases.

(*b*) *French Territories.* To the information already given (*Bulletin*, Vol. 21, p. 499) it may be added that Dakar, where crowding is extreme, is named as an important focus; that the disease is rare in Togo and in the Equatorial Provinces; and that in French Somaliland it is widespread, attacking lungs and glands and bones equally, although the indigenes are shepherds sleeping in tents and passing the whole day in the open air, since "custom decrees that they receive in their hands the sputa of sick relative or friend."

(*c*) *Italian Territories.* Infection is present, but not common. The scrofulous type is the commonest, but the pulmonary form is rare, and the glandular form very rare.

There is nothing of importance to add to the information already given (*loc. cit.*) from the Belgian and the Portuguese territories. In Abyssinia, according to Dyce Sharp, "tuberculosis is as widespread as in other parts of tropical Africa."

Sleeping Sickness: (*a*) *British Territories.* Here again this Report is compiled mainly from annual medical returns already noticed. Of human trypanosomiasis 15 cases were treated in 1922 in Nigeria; 8 were reported in Nyasaland, where, however, infected natives tend to hide away; 683 fatal cases were recorded in Tanganyika Territory—the Mwanza epidemic; 23 cases were detected in Kenya; and 263 (62 deaths) in Uganda. In the Anglo-Egyptian Sudan Tembura continues to supply the majority of the cases, and to stay the importation of infection all the districts that border on Uganda, the Belgian Congo, and French Equatorial Africa have been declared closed.

(*b*) *French Territories.* Statistics of numbers of natives examined and treated are given. The chief prophylactic measure practised is treatment of patients, and this implies periodical, methodical, and very searching rather than rapid surveys of the population. The fallacies of diagnosis by palpation of glands is emphasized. The local doctors should do the work; imported experts are not necessary. In this systematic treatment various derivatives of phenyl-arsenic acid have been tried, especially No. 189 and No. 190 (stovarsol), also "Bayer 205" and tryparsamide, both of them giving encouraging results; but, so far, nothing has shown itself so much superior to atoxyl as to justify its popularization. Atoxyl therefore remains the basis of the standard treatment, which, for early infections, consists of 6 massive injections per annum, at intervals of 10 days, of doses of 1·5 to 2·0 cgm. per kilogm.

(*c*) *Belgian Congo.* The report is very short and deals mainly with the training of native hospital assistants as searchers. Diagnosis is by palpation of glands.

(*d*) *Portuguese Territories.* The tone of the report here is rather perfunctory, except in the case of the island of Principe. In Angola the infection is *Trypanosoma gambiense* and the carrier *Glossina palpalis*; *G. fusca, pallidipes, longipalpis,* and *brevipalpis* are very rare; there are a few tracts where fly abounds, but the disease is there unknown; among possible reservoirs of the disease the pacaca cattle (*Bos brachycerus*) are mentioned. The prophylactic measures employed are treatment in concentration camps, and in certain places clearing. In Mozambique *T. rhodiense* is the infection and *G. morsitans* the carrier; but cases are few. *G. fusca* and *pallida* are rare. Closure and sanitary surveillance of roads from Rhodesia and Nyasaland is the chief precautionary measure.

Da Costa's story of the clearing of the island of Principe from *Glossina palpalis* and the concurrent extinction of sleeping sickness is summarized. The island, which lies about 120 miles off the west coast of Africa in lat. 1°.4' N., has an area of about 48 sq. m.; much of its surface where uncultivated was covered with tropical jungle intersected with streams and swamps. Tsetse fly and sleeping-sickness are supposed to have been introduced with cattle and slaves from the mainland, about 1825. In 1902 the population was over 4,000; in 1907 owing to the ravages of sleeping sickness, it had fallen to 3,000, notwithstanding the continued importation of labourers. A methodical campaign of clearing, drainage, extermination of pigs and dogs that had run wild and thinning of the local fauna of civets and monkeys, and of catching the tsetse-flies by means of perambulating negroes wearing a back-piece of dark-coloured bird-limed cloth, resulted, in the course of a few years, in the extinction of the fly. In 3 years, 1911–13, nearly 470,000 flies were caught. At the same time the blood of the entire population was examined every 3 months, and every infected individual was isolated and treated with atoxyl.

(*e*) *Spanish Territories in the Gulf of Guinea.* Sleeping sickness is endemic in the island of Fernando Po, and on the mainland there are scattered foci in the numerous river-basins. In Fernando Po HUERTA saw, at the S. Isabel Hospital, 150 cases in 1920, and 36 cases in one month in 1923. Modern methods of treatment are current, but as regards prevention, "Any form of prophylaxis is difficult to apply, owing to the ignorance and obstinacy of the people."

As regards other parts of Africa, there are some who think that sleeping sickness may exist in the lowlands of Abyssinia, but know nothing for certain.

One of the appendices to the Report gives Dr. VAN CAMPENHOUT'S objections to the appointment of a special Sleeping-Sickness Commission. He thinks—and there are many who will agree with him—that local laboratories established in the infected areas are aptest both for studying the disease and devising measures of protection. Visiting workers from other Governments might be attached to these laboratories for a definite term, and the laboratories might receive grants from a fund collected by the League of Nations. The other appendix contains an extract from the minutes of the third session of the Health Committee of the League of Nations, which includes the Committee's recommendations to the Council of the League on the subject of sleeping sickness. These recommendations include the appointment of a special mission to investigate certain fundamental questions of a biological nature.

A. Alcock.

SANITATION SUPPLEMENTS

OF THE

TROPICAL DISEASES BULLETIN

APPLIED HYGIENE IN THE TROPICS.

ISSUED UNDER THE DIRECTION
OF THE HONORARY MANAGING
COMMITTEE OF THE TROPICAL
DISEASES BUREAU.

General Editor:
THE DIRECTOR OF THE BUREAU.

1925.

(Supplements Nos. 1, 2, and 3.)

London:
TROPICAL DISEASES BULLETIN;
23, Endsleigh Gardens, W.C. 1.

1925.

HONORARY MANAGING COMMITTEE.

Dr. Andrew Balfour, C.B., C.M.G.

Major-General Sir David Bruce, K.C.B., F.R.S.

Major-General Sir R. Havelock Charles, I.M.S., G.C.V.O., K.C.S.I.

Sir Walter M. Fletcher, K.B.E., F.R.S.
(representing the Medical Research Council).

Dr. A. E. Horn, C.M.G.

Lieut.-General Sir William B. Leishman, K.C.B., K.C.M.G., F.R.S., K.H.P.

Professor C. J. Martin, C.M.G., F.R.S.
(representing the Royal Society).

Sir John M'Fadyean, M.R.C.V.S.

Sir S. Stockman, M.R.C.V.S.

Mr. P. B. B. Nichols, *M.C.*
(representing the Foreign Office).
with
Mr. J. B. Sidebotham,
of the Colonial Office as Secretary.

STAFF OF THE BUREAU.

Director:
A. G. Bagshawe, C.M.G., M.B., D.P.H. Cantab.,
of the Uganda Medical Staff.

Assistant Director:
J. F. C. Haslam, *M.C.*, M.D., D.P.H., M.R.C.P.E.

Secretary and Librarian:
R. L. Sheppard.

Editors of the Sanitation Supplements:

Supplement No. 1:
Lt.-Col. W. Wesley Clemesha, C.I.E., I.M.S. (retd.).

Supplements Nos. 2 and 3:
Lt.-Col. G. E. F. Stammers, O.B.E., R.A.M.C. (retd.).

CONTENTS.

SECTIONS.

	PAGES.
Child and Infant Welfare	... 52, 138–9, 216–18
Conservancy	45–50, 130–2, 205–12
Disease Prevention	1–29, 85–120, 167–91
Disinfection	51–2, 134–8, 213–15
Food	... 45, 124–32, 201–5
Industrial Hygiene	... 141–6, 219–20
Medical Inspection of Schools	... ... 53, 139–41
Miscellaneous	70–7, 157–63, 237–44
Reports and Vital Statistics	53–70, 146–57, 221–37
Reviews	77–83, 164–5, 244–6
Smallpox Vaccination	... 50–1, 132–4
Water	29–43, 120–4, 191–201

Index of Authors	247–9
Index of Subjects	250–9

ILLUSTRATIONS.

	PAGES
Hollandsch-Amerikaansche Plantage Maatschappij, General Lay-out of Coolie Lines	2
Incinerators and Refuse Receptacles	3 *bis*
Latrines	4
Taking Blood Smears, Haemoglobin Examination and Hookworm Treatment	4
Worms from 150 men, Wadi Halfa Quarantine	6, 7
Rat-proof Atap and Tiled Roofing	21–4
Wells, Defective and Properly Constructed and Protected	38–42
Boulton Water Elevator (Caruelle Patents)	44
Map showing Lack of Trained Personnel for Spreading Public Health Education, Philippine Islands... ...	54
Maps of Western Hemisphere showing Yellow Fever in Retreat	55
Diagram showing Reduction in Average Daily Number of Patients Treated in the Lionel Town Hospital, Jamaica, after Hookworm Campaign	55
Mosquito Breeding-places	56
" Mojarrito " Hatcheries, Mexico and Brazil	57
Diagram showing Combined Death-rate from Malaria in the Canal Zone and in Panama and Colon Cities ...	58
Chart showing Mortality of European Infants in South Africa	69
Thika-Nyeri Railway Construction, Kenya: " Kongoni " Hut for Native Camps	95
Standard Hospital Ward	97
Out-patient Dressing Hut	97

(K2812) Wt.P.1931/207 1,250 3/26 H & Sp Gp 52

ILLUSTRATIONS—*contd.*

	PAGES
Charts showing Elimination of Malaria and Decline in Death Rates on Seafield Estate, Malaya	101, 102
Concrete Drainage Pipes, Making and Laying of	108–9
Rat-Guard for Ships' Hawsers	116
Rat-proofing of Sheds and Shacks on Wharves: Liverpool	119
Type Plans of Australian Standard Laboratories and Animal Houses	158, 159
Lethal Chamber for Dogs, Madras-Type Design	160
Installation for Artificial Air Cooling of Room at Calcutta School of Tropical Medicine	162
Hospital Ward showing Cooling Method, with Damp Khuskhus Screen	163
Sanitation of Baoe-Baoe Swamp:	
Construction of Floor of Main Drain	171, 172
Construction of Closed Drains	172, 173
Rat-burrows and Rats dead *in situ*	190
Supply of Drinking Water to Vessels, U.S.A.	195–200
Fly-Proof Pail pattern Latrine and Pit Privy pattern (Park Ross)	212

TABLES.

List of Wild Rodents known to Suffer from Spontaneous Plague	18–19
List of Fleas of Rodents suffering from Natural Plague ...	20
Malaria Cases, Spleen Rates and Death Rates on Seafield Estate (1911 *sqq*)	103

Erratum.

No. 1, 1925, p. 64, lines 9 and 10. The birth and death rate for Mauritius for the year 1923 should read 36·8 and 28·5 *per mille* respectively, instead of *per cent.*

INDEX OF AUTHORS.

A

Alexander, D., 146
Allen, H. W., with Harned, 137
de Almeida, E., 138
Amritaraj, S., 65
d'Anfreville de la Salle, —, 92
Annales de Médécine et de Pharmacie Coloniales, 186
Archibald, R. W., with Whittaker, & Shere, 203
Armstrong, W. G., 224
Aserappa, C. V., 154
Atkinson, R. C. E., 164

B

Bagchi, K. N., with Ross, 120
Bagshawe, A. G., with Balfour, van Campenhout, & Martin, 244
Balfour, A., 232, 237 *bis*
E. van Campenhout, G. Martin, & A. G. Bagshawe, 244
Ball, G., 50
Banerjee, N. L., with Stewart, 242
Barber, M. A., & W. H. W. Komp, 16
Barnes, M. E., 13, 130, 185, 186
Barradas, A., with Prates, 104
Bastin, E. A., 43
Bernard, L., & Marchoux, 107
Blacklock, D. B., & W. H. Peacock, 20
Bolton, J., 208
Bote, G., 107
Bouffard, G., 219
Bousfield, L., 228
Boyd, J. E. M., 114
Brooke, G. E., 243
Brownell, O. E., 38
Brunet, F., 26
Buchanan, G. S., 188
Bulletin Office International d'Hygiène Publique, 236

C

Cameron, J., 188
Campbell, E. A. G., 242
van Campenhout, E., with Balfour, Martin, & Bagshawe, 244
Carneiro e Menezes, M. de V., 76
Carter, H. R., & J. A. Le Prince, 105
Chen, T., 219
China Medical Journal, 138
Chubb, E. M., 139
Clemow, F. G., 169
Connolly, J. L., & A. E. Gorman, 194
Corner, W., 182
Correia, A. C. G. da S., 74, 76
da Costa, A. G., 75
Couvy, A., 105
Cranford, O. L., & O. W. Statham, 180
Cumming, H. S., 16, 50, 51
Cunningham, J., 226
& T. N. S. Raghavachari, 35, 73
Curry, D. P., 111

D

Le Dantec, A., 91
Darling, S. T., 179, 180
Davey, J. B., 230
Davis, C. N., 225
De, S. N., 204
Deeks, W. E., 234
Diacono, H., with Juillet, 215
Dickson, J. R., 61
Dinguizli, —, 10 *bis*
Doorenbos, W. B., 1
Dujardin-Beaumetz, —, 20
Dukes, C., 164
Dutch East Indies Civil Medical Service, 223

E

Ekanayaka, H. E., 53
Eldridge, E. F., 27
Émily, —, 157
Espinasse, —, 63
Essed, W. F. R., with Rodenwaldt, 183
Evans, A. M., with Newstead & Potts, 136

F

Faust, E. C., 47
Le Favre, H. B., 204
Fernós Isern, A., 156
Ferrell, J. A., 178

Fisher, H. C., 58, 176
Fisher, V. M., 94
Flood, G. M., 49
Flu, P. C., 25
Fowler, G. J., 206
Fowler, J. K., 82
Frederick, R. C., 240

G

Gage, E. H., 184
Garcia, O., A. Vazquez-Colet, & G. R. Lacy, 12
Gautier, A., 27
Gelonesi, G., 21
Gilchrist, T. B., 64
Giles, J. L., 229
Goodwin, E. St. G. S., 28
Goldthwaite, —, 59
Gonzalez, A., 140
Gordon, J., 11
Gorman, A. E., with Connolly, 194
Gouzien, P., 243
Govinda Raju, V., 192
with Stewart, 191
Green, H. W., 110
Gunasekara, S. T., 8
Gutteridge, A. G., 209

H

Harned, R. W., with H. W. Allen, 137
Hartwell, G. A., 201
Haslam, J. F. C., 186
van Hasselt, T. L., 170
"Health" (Melbourne), 157, 242
Heckenroth, F., 87
Henderson, J. B., & A. S. Hurwood, 202
Heron, G. W., 14, 106
Hill, R. B., 233
Hofmeyr, G. R., 62
Home, W. E., 10
Hone, F., 216
Hoover, C. P., 42
Hope, E. W., 167
Houston, A., 29
Hurwood, A. S., with Henderson, 202
Hutchinson, F. H. G., 13

I

International Labour Review, 219

J

Jameson, R. W., 133
Juillet, A., & H. Diacono, 215

K

Kauntze, W. H., 61, 229
Kenya Medical Journal, 17
Khalil, M., 45
King, H. H., 213
Kligler, I. J., & J. M. Shapiro, 107
Kobayashi, H., with Shiiba, & Midzushima, 132
Koh, Z. W., with Winslow, 223
Komp, W. H. W., with Barber, 16

L

Lacy, G. R., with Garcia, & Vazquez-Colet, 12
Lal, R. B., & C. D. Tiwari, 214
with Tiwari, 189
League of Nations, Health Organisation, 223
Ledingham, J. C. G., 134
Legendre, J., 51, 105
Leiper, R. T., 174
Leishman, W., 238
Letonturier, —, 91
Levermore, F. E., 132
Lim, C. E., 168
Lochhead, J., 70
Longley, F. F., 34
Low, N., 185

M

M., I. W. D., 9
Madras Local Self-Govt. Dept., 159
Maitland, C. T., 145
Maitra, J. N., 240
Marchoux, E., 105
Marchoux, —, with Bernard, 107
Marjoribanks, E. M., 66
Martin, G., with Balfour, van Campenhout, & Bagshawe, 244
Massey, A., 9
May, H. O'H., 147
Megaw, J. W. D., 161
Midzushima, H., with Kobayashi, & Shiiba, 132
Mitchell, J. A., 68, 115
Miyairi, K., 73
Mom, C. P., 33
Montague, A., 68
Mora, D., 87
Munro, D., 175

N

Neveu-Lemaire, M., 83
Newman, G., 221
Newsholme, A., 93
Newstead, R., with Evans, & Potts, 136

O

O'Dea, M. E., 148
Olitzki, L., 92
Orosa, S. L., 140
Ortt, M. W. A., 72
Owen, W. E., 132
van Oye, P., 70

P

Peacock, W. H., with Blacklock, 20
Pearse, L., 47
Peiris, S. J., 217
Philippine Islands, 80
Pirow, H., 220
Potts, W. H., with Newstead, & Evans, 136
Prates, M. M., & A. Barradas, 104
Le Prince, J. A., 15, 106
with Carter, 105
Public Health Reports, 35, 109, 114, 117, 121

R

Raghavachari, T. N. S., with Cunningham, 35, 73
Raynaud, L., 17, 107
Revista Medico-Cirurgica do Brasil, 173
Robertson, D. G., 141
Rodenwaldt, E., & W. F. R. Essed, 183
Rodhain, J., 87
Romby, P., 120
Ross, G. A. P., 211
Ross, W. C., & K. N. Bagchi, 120
Rucker, —, 59
Russell, F. F., 53
Rutherford, G. J., 227

S

St. John Ambulance, 165
Sant'Anna, J. F., 76
dos Santos, F. F., 75
Sarangdhar, V. N., with Temple, 205
Savage, W. G., & P. B. White, 124, 125
Schaefer, H. F., 52, 170
Senior-White, R., 104
Severn, A. G. M., 191
Shapiro, J. M., with Kligler, 107
Shere, L., with Whittaker, & Archibald, 203
Shiiba, Y., with Kobayashi, & Midzushima, 132
Simpson, W., 150, 151
Smith, W., 45
Southern Medical Journal, 178
Spence, B. H. H., 5
Stammers, G. E. F., 85
Statham, O. W., with Cranford, 180
Stewart, A. D., & N. L. Banerjee, 242
& V. Govinda Raju, 191
Stewart, A. W., 81
Stokes, T. G. N., 65
Straub, M., 67
Streeter, H. W., 123
Surveyor & Municipal & County Engineer, 48
Suzuki, T., 156

T

Temple, F. C., & V. N. Sarangdhar, 205
Tiwari, C. D., & R. B. Lal, 189
with Lal, 214
Tomb, J. W., 98
Trimble, H. E., 134

V

Vandenperre, L., 218
Vassal, J., 87 *bis*
Vazquez-Colet, A., with Garcia, & Lacy, 12
Vervoort, H., 21

W

Walch, E. W., 178
Wallace, E. W., 177
Walravens, —, 104
Waters, H. G., 165
Watson, M., 14, 100, 101
Webster, J. S., 71
Were, M. J., 52
White, C. F., 116
White, F. N., 77, 85
White, P. B., with Savage, 124, 125
Whittaker, H. A., R. W. Archibald, & L. Shere, 203
Wilson, B. M., 60
Winslow, C. E. A., & Z. W. Koh, 223
Wolff, J. W., 236
Wolff, L. K., 194
World's Health, 16
Wu, Lien-Teh, 18, 78

INDEX OF SUBJECTS.

Compiled by MISS M. H. JAMES.

Bacteriological References
Bacterial Content of Soured Milk, Ceylon, 228
Bacteriological Examination of Sewage, 46
Stools of Food Handlers in Manila, 12–13
Bacteriology of Food, 164
Lactose Fermenting Organisms, Methods of Differentiating under Indian Conditions, 73
Salmonella Group in relation to Food-poisoning, 124

Child and Infant Welfare, 52, 138–9, 216–18, *see also* **Vital Statistics**
Breast-Feeding, 218
Child Labour in China, 138, 219 *bis*
Porto Rico: Bureau Established, 234

Conservancy, 45–50, 130–2, 205–12
and Helminth Infestation in
British Guiana, 45
China, 47
Incineration and Incinerators, 49–50
in Khartoum, Problem of, 228
Latrines, 228
over Drainage Trenches, 45
Fly-proof, for Coloured Persons, 211–12
Pit, 45
in Porto Rico, 233
Septic Tank, 45, 46
Night Soil, Treatment of, Solar Light and Heat in, 130
Pail Closet, 45
Refuse Disposal
Efficiency in, 49–50
Removal from Houses by Motor Transport, 50
Sewage in the Tropics, Protozoological Examination of, 46
Sewage Disposal
Hygienic, 132
in British Guiana, 45–7, 132
in India: Jamshedpur Works, 205–6
Sea-water as Transporting Medium, 209 *sqq.*

Conservancy—*cont.*
Sewage Purification
Bacteriological, Inadequate as regards Helminths, 46
at Manchester, 48–9
Sludge, Activated
Dewatering of, 47–8
Elasticity of the Process, 208
in the Tropics, 205, 206 *sqq.*
Units of, Operation of: Manchester, 48–9

Countries referred to, *see also* **Reports and Vital Statistics**
Africa
Medical and Sanitary Aid to Natives of, 76
Equatorial: Tuberculosis and Sleeping-Sickness 244 *sqq*
North
Diseases Present, Spread of, and Prevention of, 10 *bis*, 11
South, Union of
Child Life in Avoidable Waste of (*Chart*), 68
Plague Foci in, 221
Cape Province, School Children's Defects in, 139
Witwatersrand Gold Mines: Conditions affecting Miners' Health, 220
South-West: Health Conditions (1923), 62–3
Algeria
Plague in (1899–1924), 17–18
Smallpox in, 222
America
Central, Yellow Fever in, 221
South, Plague Foci in, 221
West Coast of, Bubonic Plague on, 59
Tropical
United Fruit Co.'s Plantations, Malaria Prophylaxis for, 105, 234
U.S.
Anti-Malaria Work in, 16–17
Bed-bug Control in Steam-Heated Rooms, 137
Drinking Water as Supplied to Vessels, 194 *sqq.*
Malaria Diminution, 178

Countries referred to—*cont.*
America, U.S.—*cont.*
Malaria, Highways and, 16
Malaria Statistics, 33–4
Plague Foci in, 221
Water Filtration Plants on the Ohio, 123
Water Standards, Proposed, for, 121
Columbus, Ohio, Water-works Experiments, *see under* **Water**
Massachusetts : Chlorides in Water in, 34
Minnesota ; Pasteurizing Plants Milk-bottle Sterilization Methods Compared, 203-4
Smallpox Epidemic (1924), 50–1
New York : Quarantine Station, Delousing of Clothes and Baggage at, by Vacuum Cyanide Method, 134
Virginia : Concrete Drainage Pipes in, 107
Anglo-Egyptian Sudan
Wadi-Halfa Quarantine, 5–6
Angola
Care of Native Labourers on Estates, 75–6
Diseases Prevalent, 88
Health Resorts in, and elsewhere, 76–7
Medical Assistance to Natives of, 75
Mental Hospitals in, 76
Sanitary Organization of, 87
Arabia
Haj in, and Disease Control, 169
Asia : Lung-Fluke in, 173
Asiatic and other, Plague Pandemic in, 114–15
Australia, Commonwealth of
Alastrim in, 134
Chlorides in Water in, 34–5
Commonwealth Health Labs., Standard Plan, 157
Infant Mortality, 216–17
Industrial Medical Service, 141 *sqq.*
New South Wales
Brisbane : Skin-affection, Mite-caused, in Upholsterers, 242
Belgian Congo
Antimalaria Work, 104
Diseases Prevalent, 88, 89
Infant Mortality, 218
Medical Services in, 87
Equator Province, Marshes of, 70
Bermuda
Diseases Prevalent, 232, 233

Countries referred to—*cont.*
Bermuda—*cont.*
Mosquitoes of, 232–3
Brazil
Diseases Prevalent, 173
Hookworm in Agriculturists in, 53
Public Health (1924), 173–4
Yellow Fever in, 221
British Guiana
Conservancy and Helminthic Infestation, 45–7
Larvicidal Fish used in, 186–8
Sanitation in, 132
British Honduras
Diseases Prevalent, 60–1
Sanitation, 60
Canada, Smallpox in, 222
Ceylon
Ankylostomiasis Campaign in, 227
Diseases Prevalent, 227–8
Among School-children, 53
Infant Mortality, 217–18
Medical Inspection of Schools, 53
Public Health, 8–9
China
Child Labour, 138, 219 *bis*
Cockroach Eradication, 188
Conservancy and Helminthic Infestation, 47
Labour Conditions and Regulation, 219 *bis*
in Match Factories, 145–6
Phosphorus Poisoning in Match Factories, 145
Plague in (1894 *sqq*), 221
Port Sanitation, 168–9
School Health Conference, 177
Smallpox Epidemic (1924), 222
Hong Kong
Plague-history of, 191
Port Sanitation, 169
Shanghai
Public Health (1924), 225–6
Sanitation, 169
Colombia, Plague in, 221
Bogota : School Children's Physical Condition, 140–1
Corsica, Anti-malaria Work recommended in, 107
Countries Patrolled by R.A.F. : Diseases Prevalent, 156
Countries in which
Plague is Spread by Rats and their Ectoparasites, 188–9
Rodents Suffer from Plague, *Table*, 18 *sqq.*
Cuba : Food-Poisoning in, of U.S Marines, 204–5
Dutch East Indies
Anti-Cholera and Anti-Plague Measures in, 25–6

Countries referred to—*cont.*
Dutch East Indies—*cont.*
Diseases Prevalent, 224
Hookworm, 178
Malaria, 178–9
Smallpox Epidemic (1924), 222
Water Chlorination in : Taste and Smell, 33–4
Celebes : Baoe-Baoe : Sanitation, 170 *sqq.*
Java : Tandjong Priok, Malaria at, 183–4
Sumatra, Sanitation System and Health Control in, 1 *sqq.*
Deli : Infant Mortality, 67–8
Egypt
Anti-Bilharzial Measures, 175
Smallpox in, 222
Ismailia : Antimalaria Work, 185
Far East : Epidemiological Intelligence Bureau, proposed, 85
French African Colonies (Soudan, &c.), Yellow Fever foci in, 244
French Cameroons : Medical Service, 91
French Colonies : Malaria-combating Instructions for, 186
French Equatorial Africa
Diseases Prevalent, 89
Medical Service in, 87
Sanitary Service : Use in, of Natives, 87
French West Africa
Diseases Prevalent, 90, 243–4
Epidemiology and Spread of Disease : Sanitary Conventions, 243–4
Medical Service, 87
Yellow Fever, 221
Gibraltar : Colonial Hosp. Medical Report (1923), 70
Gold Coast
Diseases Prevalent, 149
Yellow Fever in, 221
Foci of, 244
Gold Coast Colony and Ashanti
Mine Workers' Conditions in, 150–1
Plague Outbreak (1924), 151
Great Britain
Food Poisoning in, 124 *sqq.*
England
Quarantine and Ship-Inspection, 167, 168
Trench Fever, 222
Bury, Lancs., Activated Sludge Process at, Elasticity of, 208–9

Countries referred to—*cont.*
Great Britain—*cont.*
England—*cont.*
St. Helen's, Typhus Fever at, 222
England and Wales
Leprosy in, 222
Malaria, Indigenous, 222
Greece
Anti-Malaria Work in, 16
Anti-Typhoid Measures, 27
Holland : Care in, of Children born in D.E.I., 72
India
Diseases Prevalent
Cholera, 221
Plague : Prevalence, 221
Keeping Cool in : Various Means for, 161
Milk Supply, Urban, 45
Rural Health Problem, 9
Sewage Disposal : Activated Sludge Method, 205 *sqq.*
Water Reaction and Hardness in : Seasonal Variation 120
Assam
Malaria and *Anopheles* of, 14–15
Malaria Control in Tea Gardens, 100
Bengal
Asansol Mines Board of Health Outdoor Organization, 98
Central Provinces and Berar
Anti-Malarial Measures, 65
Medical Inspection of Schools, 65
Madras
Lethal Chamber for Dogs, 159
Slow Sand Filters in, 192–3
Water-Supplies, *see* **Water**
Bangalore
Fever Mortality, 66
Plague Outbreak, 65, 66
Púnjab
Plague Disinfestation by Cresol Fumigation, 214–15
Mian Mir
Drainage absent, 15
Malaria at, 100
Iraq
Cholera Epidemic (1924), 175
Shiah Pilgrimage in, and Disease Control, 169
Italy
Anti-Cholera Inoculation in 3rd Army (1915–16), 120
Malaria and Antimalaria Work in, 107 *bis*
Ivory Coast
Diseases Prevalent, 220

Countries referred to—*cont.*
Ivory Coast—*cont.*
Labour, Classification and Sanitation of, 219–20
Jamaica : Housing Problem of the Poor in, 242
Japan
Diseases Prevalent, 73–4
Nation's Health : A Method of Investigation, 73–4
Sewage Disposal, Hygienic, 132
Kamaran, Island of, Lazaret of, 13
Kenya
Diseases Prevalent, 229–30, 231
Kavirondo Practice of Smallpox Inoculation, 132
Medical Arrangements for Native Railway Labour, 94
Plague in, Economics of, 17
Loanda : Climate, Diseases Prevalent, and Sanitation, 74–5
Madagascar : Antilarval and other Antimalarial Work, 105
Malaya (F.M.S.) : Infant and Maternal Welfare Work in, 52
Mauritania : Diseases Prevalent, 63–4
Mauritius : Diseases Prevalent, 64
Mesopotamia, *see also* Iraq
Kirkuk Division, Malaria in (1923), 182–3
Nigeria : Yellow Fever, 221
Palestine
Antimalarial Advisory Committee: Proceedings (Nov., 1924), 106
Diseases Prevalent, 11–12, 92, 93, 106, 107
Malaria Prevalence in, 106, 107
Mosquito Control Areas, Organization of, 107
Sanitary Organizations, 92
Panama
Canal as Barrier to World-Spread of Disease, 176
Diseases Prevalent, 58–60, 111 *sqq.*
Malaria and Malaria Control in, 106, 111, 112 *sqq.*
Mosquito Control, 111
Peru : Diseases Prevalent, 237
Philippine Islands
Health Inspection of School Children in, 140
Manila : Bacteriology of Stools of Food Handlers in, 12–13
Porto Rico
Hookworm Statistics, 53
Public Health Progress, 233–4
School at, of Tropical Medicine, 234
Russia : Plague Foci, 221
Countries referred to—*cont.*
San Salvador : Yellow Fever, 221
Siam : Public Health Developments, 13–14
Sierra Leone
Diseases Prevalent, 147–8
Goitre, 148
Singapore
Conference at of L. of N. Health Organization, Recommendations of, on an Epidemiological Intelligence Bureau for the Far East, 85
Somaliland, Southern, Deratisation with Danysz Virus, 21
Spain : Smallpox, 221
Surinam : Diseases Prevalent, 236
Tanganyika : Diseases Prevalent, 230–2
Trinidad and Tobago : Diseases Prevalent, 61
Tropics
Diseases Prevalent, 238
Health in, 238 *sqq.*
Tunis : Louse-Disinfestation by *Pyrethrum* Extract, 215

Disease Prevention, 1–29, 85–120, 167–91
Diseases and Conditions Referred to
Abscess, 231
Tropical, 222
Affecting Merchant Seamen, 10
Air-Spread by Air Vessels, 175–6
Alastrim, 134
Amoebiasis, 12, 60, 66
Anaemia, 230
Ankylostomiasis, 2, 5, 6, 7, 12, 45, 46, 53, 61, 67, 68, 76, 88, 147, 148, 150, 151, 154–5, 230, 231, 232, 236, 238
Anthrax, 225
Arthritis, 230
Ascariasis, 5, 12, 74, 147, 231
Aural, 230
Beriberi, 63, 66, 74, 81, 147–8, 157, 222
Bilharziasis (Schistosomiasis), 5, 12, 175, 230, 231
Urinary, 6
Blackwater Fever, 180, 230, 231, 235
Blindness, 230
Bronchitis, 217, 230
Cancer, 60, 61
Cataract, 230
Cerebrospinal Meningitis, 12, 74, 231, 243

Disease Prevention—*cont.*
DISEASES AND CONDITIONS REFERRED TO—*cont.*
Cholera, 12, 13, 25, 85, 86, 98, 100, 120, 175, 221, 222, 238
Circulatory, 223
Conjunctivitis, 230
Dengue, 111, 112, 231, 233
Dental Caries, 231, 240
Diarrhoea, 61, 64, 97, 98, 100, 217
Digestive, 230
Diphtheria, 12, 59, 222, 225
Dysentery, 60, 61, 64, 68, 74, 88, 97, 98, 100, 147, 156, 220, 224, 227–8, 231, 236, 238
Bacillary, 12, 60, 220, 222
Enteric Fevers, 12, 27, 60, 61, 62, 68, 74, 222, 228, 231, 238
Paratyphoid, 12, 156
Typhoid, 10, 12, 156, 235–6
Enteritis, 61, 64, 217
Epilepsy, 230
External, 223
Fasciolopsis Infestation, 175
Fever, form unspecified, 100
Filariasis, 45, 67, 111, 112, 148, 231, 236, 238
Goitre, 27, 148
Gonorrhoea, 63
Guineaworm, 63
Helminthic Infestations, 5, 12, 62, 63, 66, 67, 74, 89, 147, 148, 175, 230, 231, 232, 238
Hookworm, *see* Ankylostomiasis, supra
Impetigo, 231
Influenza, 64, 66, 68, 97, 157, 175
Itch, 53
Kala Azar, 9, 231
Leg Wounds, 2, 5
Leishmaniasis, Dermal, 12
Leprosy, 12, 75, 90, 91, 148, 173, 222, 229, 232, 236, 238
Louse-infestation, 5–6, 26–7, 134, 138, 215
Malaria, 2, 3, 10, 11, 14 *sqq.*, 53–4, 58, 60, 61, 63, 64, 66, 67, 74, 88, 90, 97–8, 100 *sqq.*, 156, 178 *sqq.*, 182 *sqq.*, 222, 224, 231, 232, 234–5, 236, 238
Myiasis, Cutaneous, 231
Nephritis, Alcoholic, 236
Ocular, 230
Phosphorus Poisoning, 145
Phthisis, 66
Plague, 9, 12, 17 *bis sqq.*, 25-6, 59, 61, 62, 64, 65, 74,

Disease Prevention—*cont.*
DISEASES AND CONDITIONS REFERRED TO—*cont.*
Plague—*cont.*
77 *sqq.*, 85, 86, 90, 98, 114 *sqq.*, 155, 176, 188–9, 191, 221, 224, 229, 238, 243
Bubonic, 225–6
Pandemic (1894–1925), 114–15
in Rodents, 12, 26, 62, 85, 115, 118, 155, 168, 226
Wild, especially Tarbagan, *table*, 18 *sqq.*
Pneumonias, 88, 97, 98, 157, 217, 230, 236
Pyorrhoea, 230, 236, 240
Rabies, 10, 12, 93, 176
Relapsing Fever, 5, 6, 12, 63, 66, 93, 149, 231, 238, 243–4
Respiratory, 10, 61, 64, 66, 88, 97, 108, 156, 157, 217, 223, 230
Sandfly Fever, 156
Scabies, 2, 231
Scarlet Fever, 222
Gibraltar Epidemic (1923), 70
Scurvy, 63, 231
Seven-Day Fever, 231
Skin, 92, 157, 231
Mite-caused, in Upholsterers, 242
Sleeping Sickness, 76, 88, 90, 149, 238, 245
Smallpox, 12, 13, 50, 63, 74, 75, 85, 86, 90, 98, 99, 100, 132 *sqq.*, 175, 220, 221, 222, 224, 230, 231
Two types of, 133
Sprue, 222
Stomatitis, 230–1
Syphilis, 9, 60, 63, 75, 89, 90, 156, 216, 217, 229, 232, 236
Taeniasis, 231
Tetanus, 218, 229
Tick Fever, 232
Trachoma, 2, 12, 63, 140
Trench Fever, 222
Trichocephaliasis (*T. dispar* Infestation), 231
Trypanosomiasis, 88, 89, 90, 91, 149, 230, 231, 238
Tuberculosis, 10, 58, 59, 60, 61, 63, 74, 75, 81, 88, 89, 90, 92, 138, 140, 147, 156, 157, 173, 222, 223, 224, 229, 234, 244
Bovine, 59
Tumours, 231
Typhus Fever, 5, 12, 26, 93, 136, 175, 215, 222, 231, 238, 243, 244
Ulcers, 94, 98, 231

Disease Prevention—*cont.*
DISEASES AFD CONDITIONS REFERRED TO—*cont.*
Undulant Fever, 230
Urino-genital, 223
Venereal, 2, 5, 76, 92, 147, 157, 222
Yaws, 61, 62, 89, 229, 231, 232
Yellow Fever, 26, 55 (*fig.*), 59, 74, 85, 111, 173, 176, 221, 238, 243–4
Zymotic, 12
METHODS EMPLOYED
Animal Protection against Malaria, 105, 179
Anopheles Control, 106 *sqq.*
and Malaria Control: Cost, 106
Anthelminthic, 174–5
Anti-Ankylostomiasis, 2, 6, 7–8, 104, 148, 151, 155, 227, 233
Anti-Cholera, 25–6, 99, 120
Anti-Kala-Azar, 9
Anti-Leprosy, 173
Anti-Malarial and Mosquito, 11–12, 14 *sqq.*, 59, 60, 65, 88, 90, 100 *sqq.*, 170 *sqq.*, 178–9, 183–4, 185, 186, 232, 233
Anti-Plague, 52, 62, 66, 90, 115 *sqq.*, 151, 152 *sqq.*, 234
Anti-Sleeping Sickness, 88, 89, 90, 91, 245
Anti-Smallpox, *see* **Vaccination**
Other than Vaccination, 134
Anti-Streptococcic Serum for Blackwater Fever, 180
Anti-Tuberculosis, 234
Anti-Typhoid
Soap, 26–7
Vaccination, 27
Anti-Typhus, 136
Anti-Venereal, 234
Arsenicals for Sleeping-Sickness, 245
Atoxyl, 89, 245
Barriers, against Disease-Spread, 176–7
Bismutho-Tartarate of Soda and Potash for Yaws, 62, 229, 231–2
Caffeine Sodio-benzoate for Blackwater Fever, 235
Camp-siting and Sanitation, 94 *sqq.*
Carriers of Malaria, Treatment of, 107
Chaulmoogra Oil, 148
Chlorine-Sterilization of Milk-bottles, 204
Cinematograph Propaganda, 226
Cleanliness, Personal, 236
Colonial Hygiene and its Organization, 92, 186

Disease Prevention—*cont.*
METHODS EMPLOYED—*cont.*
Delousing, 5, 26–7
Disease Records, 93
Disinfection (*see also that head*), 13
and Fumigation, 116
Drainage, 171 *sqq.*, 233
Drainage Ditches with Concrete Pipes, 107
Emetine, 220
Entomological Research, 180
Epidemiological Intelligence Bureau for Far East, 85
Field Work, 94
Fumigation, 168, 234
for Rat-destruction, 116, 118
Game-playing, 177
Hand-collection of Mollusc Hosts of Lung-Fluke, 175
Hand-killing of *Anopheles*, 105
Hydrogen-Ion Concentration of Waters, and Malaria, 16–17
International Control, 169
International Health Work, 223
Konimeter for Gold Mine Use, 220
Larvicides, 106, 107, 113
Cresol, 114
Larvicidal Fish, 185, 186 *sqq.*, 233
Turpentine, Pine-oil, &c., 185, 186
Latrine Provision (*see* also **Conservancy**), 45, 46
Lazaret of Kamaran, 13
League of Nations Grading of Foreign Ports, 168–9
Lectures, 99
Leper Segregation, 90, 91
Leprosaria and Leper Colonies, 173
Medical Care of Railway Labourers, 94
Medical Inspection of School-children, 92, 100
Medical Research, 179–80
Mosquito Traps. 106
Neem battis for Rat and Rat-flea Destruction, 189–91, 215
Novarsenobillon, 149, 229
Oiling, 104, 109, 110 *sqq.*, 183, 184, 186
Plague Regulations under Public Health Act *re*, 115
Port Sanitary Control, 222
Quarantine, 5 *sqq.*, 167–8, 177, 244
Quinine, 12, 88, 90, 104, 105, 106, 107, 178, 186, 233, 234, 235
Macphail's Method, 235
Rat Control, Exclusion, and Destruction, 17, 18 *sqq.*, 52, 62, 64, 90, 116, 117, 168, 176, 189, 214–15, 222, 234
Rationing, 94

Disease Prevention—*cont.*
METHODS EMPLOYED—*cont.*
Rodent-Exam., 225
Salga System, 147
Sanitary Organization in
French, Belgian and Portuguese African Colonies, 87 *sqq.*
Palestine, 92
Sanitation, 9, 10
Among Moslems, 10, 11
Sumatra System, 1 *sqq.*
School Health Programme, 177
Screening, 106, 113, 186
Serotherapy, 91, 93
Social Hygiene : Dakar, 90, 91
"Stickum Plates," 105
Sub-soil Drainage, 102, 104
Swatting, 106
Tartar Emetic, 12
Vaccination, *see that head*
Ventilation in and of
Gold Mines, 220
Ships, 170
Yaws Treatment, 62, 229, 231–2

Diseases, Spread of, Methods of
Baths, Barbers' shops and Cafés, 10–11
Carriers, Human, 12–13
Cockroaches, 28–9
Dust, 11
Fairs, Festivals, &c., 14
Flies, 11, 68
Lice, 5–6
Pilgrimages, 169–70, 175, 244
Rodents, 168, 188, 221
Travel, 9–10
Aerial, 10, 175–6
Motor Car, in Africa, 243
Ship, 222
Water, 68

Disinfection, 51–2, 134–8 213–15
Bed Bug Control in Steam-Heated Rooms, 137
Calcium Hypochlorite, Solid, Stability of, 213–14
Cyanogen Chloride as new Fumigant for Ships, 51, 59
Delousing by
Canadian Disinfestor, 138
Pyrethrum Extracts, 215
Vacuum-Cyanide, 134
Wadi Halfa Plan, 5–6
Destruction of Vermin, Especially Bed Bugs, by Hydrogen Cyanide, 136
Disinfectants for Plague, 116
Disinfestor, Canadian, in Prophylaxis of Typhus, 138

Disinfection—*cont.*
Fumigation and Gassing of
Rodents, &c., 116
Houses, with Cresol, 214–15
after Plague, 116, 154
on Steam-ships, 51
Ventilation after, 52
by Hydrocyanic Gas, Fatal Accidents from, 52

Entomological References
Aëdes sp. Bermudan, 232–3
Anopheles of
Assam, 15
Panama, 59, 113–14
Breeding-places, 15, 16, 59, 100, 180, 183, 184, 187
Feeding Habits, 181
Known or Suspected as Malaria Carriers, 100, 102, 104 *sqq.* 178, 181, 183, 184, 185
Larvae, Action on, of Oil Films, 186
Anopheline Production, Hydrogen-ion Concentration of Waters in relation to, 16
Bed-bugs, in Steam-Heated Rooms, Control of, 137
and other Vermin, Destruction of, by Hydrogen Cyanide, 136
Chiggers : Tanganyika, 231
Culicidae : Panama, 113
Cockroach as Disease-Spreader : Eradication Methods, 28–9, 188
Fleas
Action on, of Cresol Fumigation, 214
of Rats, 18, 26, 62, 148, 155, 225, 226
of Rodents, with, and Spreading Plague, 20, 188–9
Flies, Diseases Spread by, 68, 228
Fly-prevention, and Efficient Refuse Disposal, 49–50
Glossina : Gold Coast, 149
Species Spreading Sleeping-Sickness, 245
Insects destroyed on Ships by Cyanogen Chloride Fumigation, 51
Lice, Diseases Spread by, 149, 243, 244, *see also under* **Disinfection**
Infestation percentage in School-Children, Bogota, 141
Soap destructive of, 27
Mosquitoes
Bermudan, Problem of, 232–3

Entomological References—*cont.*
Mosquitoes—*cont.*
Breeding in Water Barrels : U.S. Naval Base, 109
Ticks : Australian, 225

Food, 45, 124–32, 201–5
Bacteriology of, 164
Dirty Handling of, 238
Helminth Infection by, 174
Ice-Cream, Infected, 204
Infants', Uniform Standard for, 202–3
Milk
Cows, Dried, Evaporated, and Fresh, Compared, 201–2
Curdled (Ceylon), Bacterial Content, 228
India : Urban Supply, 45
Mauritius, 65
Milk Bottles, Sterilization of, Relative Efficacy of Methods, 203–4
Poisoning, among U.S. Marines : Cuba, 204–5
100 Recent Outbreaks, 125
Salmonella Group in relation to, 124

Helminthology, Recent Advances in, Public Health Significance of, 174–5

Industrial Hygiene, 141–6, 219–20
Australian Industrial Medical Service, 141 *sqq.*
Labour Conditions and Regulation
China, 145–6, 219 *bis*
Ivory Coast, 219–20
New South Wales : Textile Mills, 224–5
Witwatersrand, Underground, affecting Gold Miners, 220
Phosphorus Poisoning and Labour Conditions in Chinese Match Factories, 145–6

Medical Inspection of Schools, 53, 139–41
Bogotà, 140–1
Ceylon, 53
India : C.P. and Berar (1923), 65
Philippine Islands : Meisic, 140
South Africa : Cape Province, 139–40

Miscellaneous, 70–7, 157–63, 237–44
Health in the Tropics, 238 *sqq.*
Hospital Construction, 71–2
Hygiene, Modern, Trend of, 237–8
Keeping Cool, Importance of, 161
League of Nations Health Section, Eastern Bureau, Cable Code for, 243
Grading by, of Foreign Ports, 168–9

Miscellaneous—*cont.*
Preventive Medicine, Teaching of, 237
Rat-distribution : Kenya, 229
Soap, Neutral Soft, Preparation of, 242–3
Ventilation Conditions, Investigation of, 240 *sqq.*
Temperature and Humidity in regard to, 241

Reports, 53–70, 146–57, 221–37
America, U.S., P.H. Service (1923), 51–2
Australian Commonwealth
New South Wales
Microbiological Lab. (1924), 225
Public Health (1923), 224–5
Bermuda : Med. & San. (1923), 232–3
British Guiana : Filariasis Commission (1924), 45
British Honduras : Medical (1923), 60–1
Chinese Mortality in U.S.A., Hawaii, and the Philippines, 223
Colombo Municipality, M.O.H. (1923), 154
Dairen : Infant Mortality, 156
Dar-es-Salaam Lab. (1923), 232
Dutch East Indies : Civil Med. Service (1922), 223–4
Great Britain
Air Ministry, Health of R.A.F. (1923), 155
Ministry of Health (1924), 221 *sqq.*
England
Metropolitan Water Board (1923–4), 29 *sqq.*
Rivers Department, Manchester, (1924), 48
F.M.S. on Infant Welfare and Maternity Work, Kuala Lumpur (1923), 52
Fiji : Medical (1923), 68
French Colonial Contingents in France, Health of (1923), 157
Gold Coast : Med. Dept. (1923–4), 148
Gold Coast Colony and Ashanti : Plague Outbreak, 151
San. Condition of Mines and Mining Villages, 150
India
Central Provinces and Berar, Health (1923), 65
Madras Presidency
Med. Exam. of Students at Presidency College, (1924), 240
Water in, Violet-producing Organism in, 35

Reports—*cont.*
India—*cont.*
Madras Presidency—*cont.*
Bangalore : Health : Civil and Military (1922–3), 65–6
King Inst. of Prev. Med.: Guindy (1923–4), 226–7
Kenya : Medical (1923), 229
Medical and Bacteriological (1923, & 1922), 61–2.
Khartoum, &c., Health and Sanitation (1923–4), 228–9
League of Nations Health Organisation : Notifiable Diseases (1924), 223
Mauritius, Med. and Health Dept. (1923), 64
Nigeria : Med. San. (1923), 146
Peru : San. Services (1922–3), 236–7
Porto Rico Inf. Mortal., (1923–4), 156
Public Health Progress, 233–4
Rockefeller Foundation : Internat. Health Board (1923), 33
Sarawak : Med. Dept. (1923), 66–7
Sierra Leone : Med. San. (1923), 147
Surinam : Statistics, 236
Tanganyika : Med. (1923), 230 *sqq.*
Trinidad and Tobago : Health Conditions (1923), 61
United FruitCo.: Med. Dept., 234 *sqq.*

Reviews, 77–83, 164–5, 244–6
Bacteriology of Food (Dukes), 164
Handbook for Use of Teachers' Training Classes for the Mackenzie School Certificate in St. John Ambulance (St. John Ambulance), 165
Hygiene Jingles (Atkinson), 164
Impression, An, of Jamaica and the Canal Zone (Fowler), 82–3
League of Nations Health Organisation. Report on Tuberculosis and Sleeping-Sickness in Equatorial Africa (Balfour, van Campenhout, Martin, & Bagshawe), 244 *sqq.*
Manual, A, of Practical Chemistry for P.H. Students (Stewart), 81–2
Manual for Use of Schools Training for the Mackenzie School Certificate in St. John Ambulance (St. John Ambulance), 165
North Manchurian Plague Prevention Service, Reports, 1923–4 (Wu), 78–80

Reviews—*cont.*
Prevalence of Epidemic Diseases and Port Health Organisation in the Far East. Report presented to L. of N. (White), 77–8
Principes d'Hygiène et de Médécine Coloniales (Neveu-Lemaire), 83
Proceedings of First National Conference [in the Philippine Islands] on Infant Mortality and Public Welfare (Wood), 80–1

Smallpox Vaccination, 50–1, 132–4 (*for details see under* **Vaccination**

Vaccination
Anti-Cholera, 120
Anti-Smallpox, 50, 51, 89, 90, 91, 93, 99, 132–3, 146–7
Lymph for, Transport of, 146–7
Use in, of Common Pins, 51

Vital Statistics, 53–70, 146–57, 221–37
Birth and Death Rates and Infant Mortality
Australia, 216–17
Belgian Congo, 218
Brazil : Death-rate,diminished,173
British Honduras, 60
Ceylon : Race Incidence, 217–18
Colombo (1923), 154
Chinese, in U.S.A., Hawaii, Philippines, 223
Dairen, 156–7
Fiji (1923), 68
French Colonial Troops in France (1923), 157
India
Bangalore (1922–3), 65, 66
C.P. & Berar (1923), 65
Japan, Inf. Mortal., Increase, and Comparative amount, 73
Mauritius (1923), 64
Porto Rico, 156
Sierra Leone (1923), 147
South Africa, 68
South West Africa, 63
Sumatra (Deli), 67–8
Trinidad and Tobago, 61
Population, Race, and Sex : Surinam, 236

Water, 29–43, 120–4, 191–201
Chlorides in, Mass., and Australia, 34–5

Water—*cont.*
Chlorinated
Taste of, 30 *sqq.*
and Smell of, 33–4
Diseases Spread by, 228
Drinking
American Methods of
Supplying to Vessels, 194
Treating, 201
Filters
Mechanical, Alum in, Economical use of, 191–2
Norit : Sterile Water-passing, 194
Slow Sand, Working of, 192–3
Filtration Plants on the Ohio, 123
Mixing Devices and Reaction Time, Columbus, Ohio, 42–3
Pumps, New, or Liquid Elevator, 43–4
River, India, Reaction and Hardness in, Seasonal Variation in, 120

Water—*cont.*
Standards, Official Report of Advisory Committee on, 121
Supplies
London, 18th Annual Report on (1923–4), 29 *sqq.*
Madras Presidency, Violet-Producing Organism in, 35
Michigan, Iodine Content of, 27–8
Pollution of, Specific Factors Responsible for, or affecting Analyses of, 35 *sqq.*
Rio de Janeiro, 173–4
Small, Used by Railroads, Protection of, 38 *sqq.*
Thika-Nyeri Railway Construction Camps, 94
Waters, Impounded, in relation to Malaria, 184–5